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ABSTRACT

The effect of future health system changes on the requirements for registered nurse (RN) personnel at the state level are examined in this report. Following a report introduction, chapter 2 discusses the baseline scenario which provides an estimate of RN requirements in the absence of three changes: the introduction of national health insurance, the increases in health maintenance organization enrollment, and the reformation of nursing roles. The impacts of these changes individually and in combination are measured against the baseline scenario in chapter 3. The appendices, which constitute a major portion of the document, include the following: the state RN requirements model, detailed information concerning the methods of estimating the results presented in chapters 2 and 3, and state projection tables. (JH)

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THE IMPACT OF HEALTH SYSTEM CHANGES ON STATES' REQUIREMENTS FOR REGISTERED NURSES IN 1985

December 1978

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FOREWORD

The Division of Nursing has assessed current and future requirements for registered nurses over 30 years; special impetus was given to these efforts by section 951 of Public Law 94–63 (Nurse Training Act of 1975) and the impending passage of some form of national health insurance. Section 951 requires that information on the current and projected supply and distribution of and requirements for nurses be furnished to the Congress on a continuing basis. To help meet the need for new data collection tools and methods, the Division developed four manpower models. This publication reports on one of these: the Vector model developed for the Division by Vector Research, Inc.

The structure of the Vector model heavily emphasizes three major anticipated changes in the health care system: the introduction of national health insurance, the increased enrollment in health maintenance organizations, and the reformulation of nursing roles. The independent and joint effects of these changes were quantitatively determined.

The first report on the Vector model dealt with the results of the analysis from a national perspective and was published by the Division under the title "The Impact of Health System Changes on the Nation's Requirements for Registered Nurses in 1985" (DHEW Pub. No. HRA 78–9). This second report concentrates on projected requirements for registered nurses at the State level.

The State model projection procedure employs assumptions and model variables that attempt to distinguish major differences in State requirements without attempting to describe many of the unique characteristics of individual States. Thus, State and local planners may find the modeling procedure itself more useful than the results obtained in the model projections. Further, planners estimating national requirements may find the results of the relative distribution of requirements across the States more useful than the absolute projections for any particular State.

We hope both manpower analysts and policymakers will find this material helpful in planning for adequate nursing services.

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1. INTRODUCTION

This is the second report on a study to analyze the effect of future health system changes on the requirements for registered nurse personnel. The first report [Vector Research, Inc., 1976] discusses the results of the analysis from a national perspective. This second report concentrates on the impact of health system changes on registered nurse (RN) requirements at the State level. The changes investigated are identical to those examined at the national level, specifically:

1. the introduction of national health insurance (NHI);
2. the increases in health maintenance organization enrollment; and
3. the reformulation of nursing roles.

The approach used to estimate the impact of the above changes on RN employment was nearly identical to that used in the earlier analysis, i.e., a comparison of the requirement for RNs in the presence and absence of these changes. These comparisons were made using a State RN requirements model which was very similar in structure to the national model described in the earlier report. The State model, described in appendix A, is composed of the three major modules—the population module, the demand-for-services module, and the nurse[1] requirements module. Each module contains a set of submodels which are similar in mathematical structure to those in the national model. However, a number of differences exist between the national and State models which reflect the introduction of State-specific parameters into the model and the difference in the availability of national and State-level data to estimate the values of the model parameters.[2]

The State model uses historical RN employment and employment vacancy data to estimate trends in the utilization of full-time equivalent[3] nursing services. These trends are projected into the future to estimate future RN employment positions in the absence of the above health system changes. The effect of these changes on RN employment is estimated by estimating the causal relationship between the change and the demand for nursing services or the attendant requirements for RN positions. For example, national health insurance is assumed to increase the demands for many forms of health services, including the nursing component of these services. Similarly, increased HMO enrollment is assumed to influence the type of services demanded and hence alter the number of nursing positions in different practice settings, as well as affect the total number of nursing positions. Changes in the role of nurses would, in contrast, primarily influence the number of nursing positions by varying the amount, type, and mix of nursing services provided to patients with a particular type of health care demand.

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[1] The term "nurse" will be used to represent "registered nurse" unless otherwise noted.

[2] A detailed description of the State RN requirements model is provided in appendix A.

[3] All nursing data contained in this report is given in terms of full-time-equivalent (FTE) positions. That is, it is the total of all full-time positions plus half of the part-time positions.

Thus, the model predicts the number of full-time-equivalent (FTE) nursing personnel that would be *required* to fill future employment positions under alternative assumptions about the occurrence of the above health system changes. Since there are other factors outside of these changes which could influence the number of RN employment positions (e.g., RN collective bargaining outcomes, supply of RNs and other nursing personnel, and the availability of health care facilities and non-nursing services), the *requirements* for RNs estimated by the model assume that:

1. The wages of RNs relative to those of other health personnel and relative to costs of providing health services remain unchanged;
2. The supplies of health system goods and services are perfectly elastic; and
3. The relationship between the health service demands in one setting and those in another setting is unaffected (unless the effect is modeled explicitly, as in the case of HMOs).

As in the previous analysis [VRI, 1976] estimates of RN requirements were made under several alternative assumptions about the timing and extent of the three health system changes above. These alternative scenarios parallel those used to analyze their impact at the national level. The baseline scenario (discussed in chapter 2) provides an estimate of RN requirements in the absence of these changes. The impacts of these changes, individually and in combination, are then measured against the baseline scenario in chapter [illegible] Finally, appendix A describes the State RN requirements model; appendix B presents more detail concerning the methods of estimating the results presented in chapters 2 through 4, and appendix C provides detailed projections of future RN requirements in the absence of the above health system changes.

2. BASELINE PROJECTIONS

To analyze the impacts of national health insurance, HMO enrollment, and role reformulation on the requirements for RNs, the model was first used to estimate future requirements for RNs in the absence of these changes. That is, a "baseline" scenario was constructed to represent the situation in which the health care system continues on its present course without major changes.[1] The following sections describe the assumptions made in the baseline scenario with respect to the future state of the health care system and the analysis of the results obtained under the baseline scenario. The results presented are given in percentages rather than absolute values. Readers interested in the number of RNs projected for each State by year are referred to the baseline data in appendix B and the State tables in appendix C.

The Baseline Scenario

The baseline scenario is a conservative extrapolation of the present trends in health care to the 1985 time frame. For the most part, the configuration of the future health care system is assumed to be an extension of the recent past. For this reason no NHI program is instituted, no HMOs are added, and limited reformulation in nursing roles is preserved under the baseline scenario.

The baseline assumption that a national health insurance program will not occur prior to 1985 provides a mechanism for estimating the requirements for RNs in the absence of any significant change in the insurance coverage of the population. Since the number of persons covered by health insurance and the level of insurance benefit found in the insured population are both increasing, the baseline estimates of the population's service demands are clearly conservative. These estimates do, however, provide the necessary data to assess the impact of national health insurance or any corresponding dramatic increases in private health insurance coverage.

Even though no new HMOs are added during the projection period, the baseline scenario assumes that the HMOs in existence in 1974 will continue to grow at rates derived from historical data.[2] The growth rate of a particular HMO is dependent on its age, with older HMOs growing more slowly. Under these assumptions the HMO population increases from 3.2 percent of the U.S. population in 1974 to 6.7 percent of the population in 1985. This percentage varies considerably from State to State. In

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[1] This scenario corresponds to the "norm" scenario described in the analysis of the impact for the Nation [VRI, 1976].

[2] The rate of HMO formulation dropped abruptly in 1975 [Weatherville and Nordby, 1975]. The baseline scenario assumes that this is not a transient but will continue through 1985.

Washington State, for example, the HMO population increases from about 42 percent of the State's population in 1972 to an estimated 82 percent of its population in 1985. Conversely, many States which do not currently have any HMOs (e.g., Alabama and Iowa) are not projected to have any in the future.

The baseline also assumes that there will be no further acceptance of nursing role reformulation. The small fraction of inpatient units and ambulatory clinics utilizing nurses in new roles is held constant at the estimated 1972 level. The plausibility of such an occurrence is reasonably low; however, this assumption is necessary to permit analysis of the degree to which changes in these roles influence the requirements for nurses.

Thus, the baseline can be considered a very conservative, albeit possible, projection of the future requirements for RNs. The degree to which it becomes a realistic projection is dependent on the degree to which the system changes investigated here occur, or the extent of other changes not foreseen or treated in this analysis.

The baseline provides a meaningful way to compare alternative scenarios and to assess the impact of implementing various health care system changes. It represents the situation in which the health care system continues on its present course, without the initiation of a national health insurance program, with limited increases in HMO enrollment, and sparse adaptation of concepts which lead to the reformulation of nursing roles. When the model is run under various scenarios in which one or a combination of health care system changes take place, the impact of making such changes can be measured by comparing the increase in RN requirements under that scenario with the increase in RN requirements experienced under the baseline scenario.

The impact of a particular scenario is measured by comparing the nurse requirements in that scenario to those of the baseline projections in 1985. To provide a consistent basis for comparison, the 1985 requirements figures are stated as percents of the 1972 RN positions. For example, the Missouri[3] baseline and NHI scenario estimates indicate a requirement for 20,671 and 22,740 FTE RNs in 1985, respectively. These numbers are about 150 percent and 165 percent of the 1972 FTE RN positions (13,780). Thus, this particular national health insurance scenario would result in an increase in Missouri's requirements for RNs of about 15 percent over that expected in the baseline case.

Baseline Results

The model hypotheses that the future requirement for RNs is dependent upon: (1) the size and composition[4] of the future population, (2) the *per capita* demand for health care services by this population, and (3) the way nurses' services are used to provide the required health care services. A change in one or more of these components will affect the requirements for RNs. Thus, a description of the factors influencing the baseline results is best provided by examining the change in these three components.

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[3] Unless otherwise noted all percentages in the report are relative to the 1972 value. Thus, the 15 percent difference between the Missouri baseline and the NHI scenario values can be related to FTE RN requirements by knowing only one value: the 1972 FTE RN positions.

[4] The State model distinguishes 10 age/sex population groupings as described in appendix A.

Figure 1 shows that the population changes alone are estimated to increase the 1985 national requirement for RNs to 117 percent[5] of the 1972 FTE RN employment level, about 120,000 additional FTE RNs. When changes in *per capita* demands are coupled with these population changes, the 1985 number of RNs required in the Nation is expected to be 132 percent of the 1972 requirement. This represents an increase of 225,000 FTE RNs. Finally, changes in the number of RNs used to provide health services (changes in nursing intensity), coupled with population and *per capita* demand changes, are expected to increase the 1985 RN requirement to 145 percent of the base year requirement. Thus, under the baseline case, the 1985 RN requirement for the Nation as a whole is expected to increase to 145 percent of the 1972 level. This represents an increase from 703,000 FTE RNs in 1972 to 1,018,000 FTE RNs in 1985, an additional 315,000 FTE RNs.

For the individual States, the projected 1985 requirements for RNs ranged from 112 to 190 percent of those in 1972. Projections for all but six of the States fell between 135 and 170 percent, with three States below and three States above this range. The three below this range, Washington, District of Columbia, Washington State, and New York State, were projected to have 1985 requirements of 112, 128, and 129 percent of their base year requirements, respectively. These relatively small increases are partly due to the anticipated low population growths in these States,[6] all of which are below the 112 percent increase projected for the Nation. In addition, Washington State is projected to have a high rate of HMO enrollment over the projection period, from 42 percent of its population enrolled in HMOs in 1974[7] to 82 percent of its population in 1985.[8] The impact of this substantial increase in HMO enrollment is to reduce the rate of growth in RN requirements over the projection period. This reduction is primarily caused by the lower *per capita* hospital inpatient demands of the HMO population. Similar but much less significant HMO-induced reductions are projected for New York and Washington, D.C., since they also are estimated to have HMO enrollment increases above the national average.

The three States whose RN requirements projections exceed 170 percent are Florida, Arizona, and Nevada. Projections for these States indicate increases in RN requirements over the projection period of 180, 181, and 190 percent of their 1972 re-

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[5] Population projections indicate the size of the population in 1985 will be 112 percent of that in 1972. The additional 5-percent increase is attributable to changes in composition of the population.

[6] Projected changes in the State population used in this analysis are provided in table B-1 of appendix B. This table shows that the population of Washington, D.C., is expected to decrease during the projection period.

[7] 1974 was the most recent year for HMO enrollment data [Weatherville and Nordby, 1975].

[8] Washington State has a 1974 HMO enrollment which is much larger than any other State in the Nation. The second highest HMO enrollment in 1974 was in California, with 14.5 percent of its population enrolled and the 1974 national average being 3.2 percent. Consequently, the presumption that its HMOs will continue to grow at the national average results in a large fraction of the Washington population in HMOs by 1985. Although unlikely, such an occurrence is not implausible.

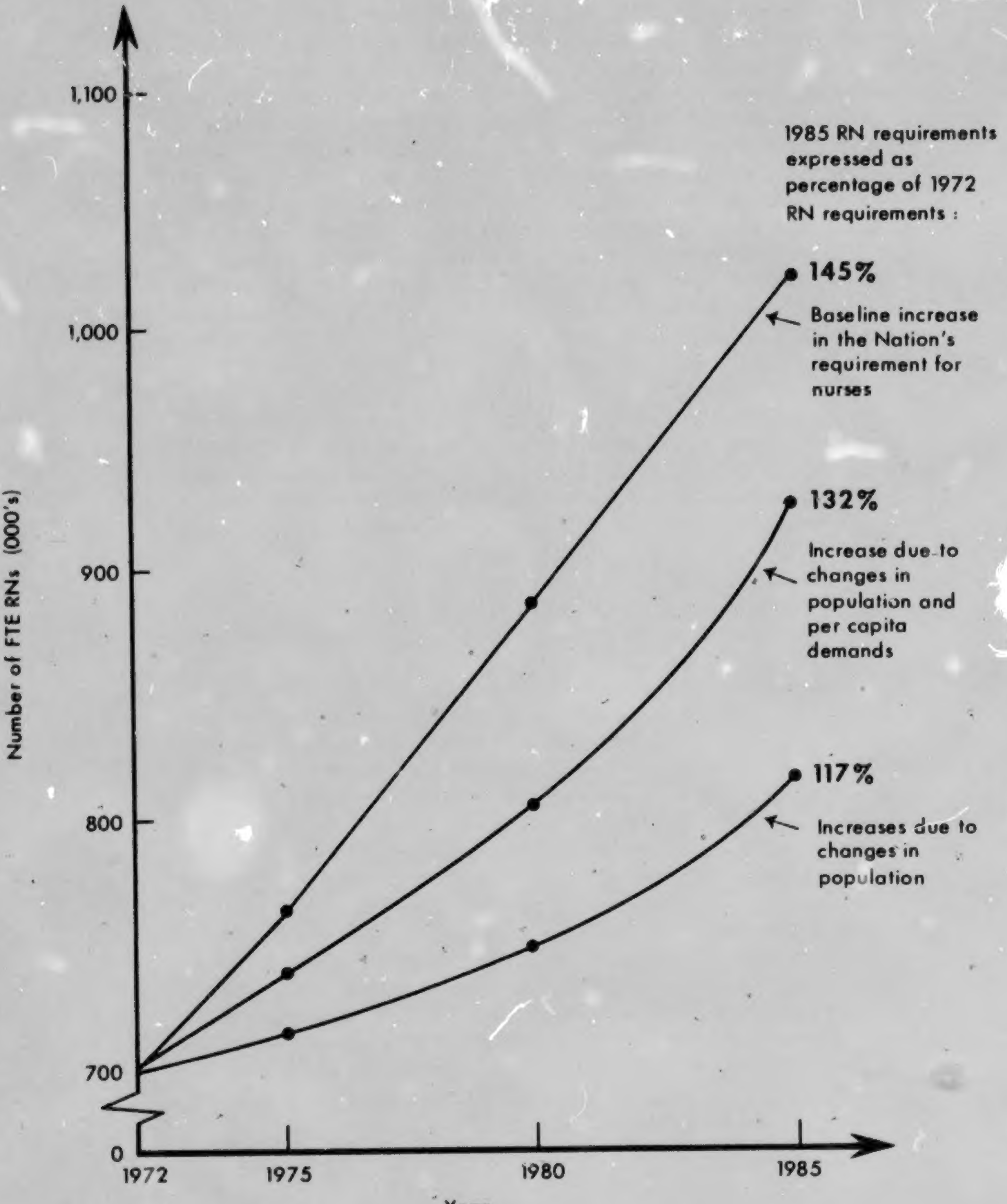

Figure 1.—National increases in RN requirements, 1972 to 1985

quirements, respectively. These increases can be attributed primarily to the estimated high population growth. The 1985 populations of Florida, Arizona, and Nevada are projected to be 141, 145, and 143 percent of their 1972 population sizes, all well above the national average of 112 percent over the same time frame. Although these States have the highest percent change in RN requirements, they collectively account for less than 6 percent of the total 1985 estimated RN requirements for the nation. This represents a collective increase from about 5 percent of the Nation's 1972 FTE RN employment levels.

The baseline distribution of 1985 RN requirements across the Nation is for the most part similar to the distribution of 1972 employment. However, a few States are projected to experience a minor increase or decrease in the fractions of the total national requirement for RNs. Table 1, for example, shows that most of the 1972 RN employment is concentrated in a few States, with New York, California, Pennsylvania, Illinois, and Ohio accounting for over 39 percent of the Nation's RN employment in 1972, and 37 percent of the projected RN requirements in 1985.[9] When the States of Massachusetts, Texas, New Jersey, Michigan, and Florida are added to the previous five, these 10 States account for about 58 percent of RN employment in both 1972 and 1985. The distribution of the Nation's RN requirements from State to State seems relatively stable from 1972 to 1985. The largest shift (in terms of the number of FTE RNs) is in the State of New York where its share of RN requirements is projected to drop from 11.4 percent to 10.2 percent during the 1972 to 1985 period.

The 1972 to 1985 change in the ratio of the number of RNs required in a State to its total population is also shown in table 1. The national average FTE RN-to-population-ratio in 1972 was 3.4 RNs per 1,000 persons. In the baseline case this ratio is projected to increase to 4.4 RNs per 1,000 persons by 1985. These RN/population ratios for individual States range from a low of 1.8 in Arkansas to a high of 5.5 in Massachusetts in 1972, and from a low of 2.6 in Arkansas to a high of 6.9 in Massachusetts in 1985.[10]

The states with high and low RN/population ratios are generally the same for both 1972 and 1985. The States with the lower ratios are generally located in the southeastern section of the country while those with more nurses *per capita* are in the northeastern section of the country. Thus, the baseline projections tend to provide estimates which continue to maintain the current distribution of active RNs across the Nation; however, the average amount of nursing resource available to the population is projected to increase even in this conservative scenario.

It is anticipated that under the baseline scenario most States

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[9] The slight decrease from 1972 to 1985 in the proportion of the U.S. RN population concentrated in these States is due to the fact that the estimated growth rate in RN requirements for these States is below the national average (see table B-11 in appendix B).

[10] The highest RN-to-population ratios are found in the City of Washington, D.C.; however, since the RNs in this city provide care to persons in the adjoining States, these ratios are inflated.

Table 1.—Baseline Results

State	Percent distribution of FTE RNs		RN/population ratios	
	1972	1985	1972	1985
Alabama	1.1	1.2	2.2	3.1
Alaska	0.2	0.2	3.8	4.4
Arizona	1.0	1.3	3.9	4.8
Arkansas	0.5	0.6	1.8	2.6
California	9.6	9.6	3.3	4.1
Colorado	1.4	1.5	4.3	5.2
Connecticut	2.0	2.0	4.7	5.9
Delaware	0.3	0.3	4.3	5.3
District of Columbia	0.8	0.6	7.3	8.8
Florida	3.4	4.2	3.4	4.3
Georgia	1.7	1.8	2.6	3.4
Hawaii	0.4	0.4	3.7	4.6
Idaho	0.3	0.3	2.8	3.6
Illinois	5.8	5.5	3.6	4.7
Indiana	2.1	2.1	2.8	3.7
Iowa	1.5	1.4	3.6	4.7
Kansas	1.1	1.1	3.3	4.5
Kentucky	1.0	1.0	2.1	2.9
Louisiana	1.2	1.2	2.2	3.1
Maine	0.6	0.6	4.1	5.1
Maryland	1.9	2.1	3.4	4.6
Massachusetts	4.5	4.2	5.5	6.9
Michigan	3.8	3.8	2.9	3.9
Minnesota	2.2	2.2	4.0	5.3
Mississippi	0.7	0.7	2.1	3.0
Missouri	2.0	2.0	2.9	4.0
Montana	0.4	0.4	3.8	4.8
Nebraska	0.8	0.8	3.7	4.8
Nevada	0.2	0.3	3.1	4.0
New Hampshire	0.5	0.6	5.0	6.0
New Jersey	3.8	3.8	3.7	4.8
New Mexico	0.4	0.4	2.7	3.5
New York	11.4	10.2	4.4	5.4
North Carolina	2.1	2.2	2.8	3.8
North Dakota	0.3	0.3	3.8	5.2
Ohio	5.1	4.9	3.3	4.4
Oklahoma	0.8	0.9	2.3	3.1
Oregon	1.1	1.1	3.4	4.3
Pennsylvania	7.5	6.9	4.4	5.8
Rhode Island	0.6	0.6	4.2	5.6
South Carolina	1.0	1.0	2.6	3.4
South Dakota	0.4	0.4	3.7	5.1
Tennessee	1.3	1.4	2.3	3.2
Texas	3.9	4.2	2.4	3.2
Utah	0.4	0.5	2.8	3.5
Vermont	0.3	0.3	4.9	6.2
Virginia	2.1	2.1	3.1	4.0
Washington	1.7	1.5	3.6	4.1
West Virginia	0.7	0.7	2.9	3.9
Wisconsin	2.2	2.3	3.5	4.7
Wyoming	0.2	0.2	3.5	4.5
United States	100.0	100.0	3.4	4.4

will experience growths in their RN/population ratio of from 120 to 140 percent over their base year level during the projection period. Also, those States which began in 1972 with a lower than average RN/population ratio are projected to experience greater percent increases in their RN/population ratio, while those with the higher 1972 ratios are projected to experience increases below the national average.[11] For example, Arkansas had a ratio of 1.8 in 1972 which is projected to increase to 2.6 in 1985 (a 144-percent increase), whereas Massachusetts, which had a much higher than average concentration of RNs in 1972 (5.5 RNs per 1,000 persons), is projected to experience an increase of only 125 percent (to 6.9).

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[11] This difference in growth of RN requirements relative to the population is primarily attributable to the use of a national average growth rate for the intensity of RN services (e.g., RNs per bed day). States which have a greater concentration of RNs are also likely to use more nursing resources per unit of service. Thus by using a national trend, the 1972 to 1985 percent change in the intensity of nursing services in these States will be lower than in States that use fewer nursing resources per unit of service.

3. IMPACT OF HEALTH SYSTEM CHANGES

The results of the baseline scenario described in the previous chapter are used as the standard for comparing the relative effects of health system changes on RN requirements. This chapter presents these relative impacts for the three system changes noted previously, i.e., national health insurance, health maintenance organization enrollment, and nursing role reformulation. The impacts are presented in terms of two incremental measures. The first provides the projected difference between the baseline percent growth [1] in RN requirements and the percent growth projected for other scenarios expressed in terms of a difference in the 1985 requirements. The second describes the absolute difference between the 1985 FTE RN requirements in the baseline and the other scenarios.

The Impact of National Health Insurance

To demonstrate the effect of NHI alone on the requirements for FTE RNs, the requirements under two NHI scenarios were compared to baseline projections. These scenarios differ from the baseline case only with respect to the NHI parameters of the model. As in the baseline scenario, HMO parameters were selected so that no new HMOs were added after 1975, but those in existence at that time continued to grow at historic growth rates. Role reformulation concepts occurred, but remained the same as in 1972, with 3 percent of hospital inpatient units utilizing primary nursing and 20 percent of unsatisfied physician's office visits filled by nurses in practitioner roles.

National Health Insurance Scenarios

Two national health insurance scenarios were examined in this analysis.[2] The first NHI scenario (NHI 1) models the situation in which the uninsured portion of the population receives insurance benefits equivalent to those enjoyed by the insured population. This is intended to represent those NHI bills which guarantee some degree of protection to everyone and thereby plug the gap in current public and private insurance coverage. The second NHI scenario (NHI 2) is designed to represent the extreme situation in which virtually free and unlimited care is provided to all, and represents the NHI bill supported by organized labor. In both scenarios the effective implementation year for national health insurance is 1979, and the total impact of NHI is expected to occur within 2 years, by 1981.

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[1] Where percent growth is expressed in terms of the 1985 requirements as a percent of 1972 employment levels.

[2] The analysis assumes that the main effect of NHI would occur in short-term general hospitals and physicians' offices. For a discussion of the impact (probably minor) of NHI in other settings, see the analysis of NHI impact for the Nation [VRI, 1976].

Under NHI 1 it is assumed that as uncovered individuals become covered, they consume health services at the same rate as those in their respective cohorts who previously had health insurance. If the benefits provided by NHI are not as extensive as those afforded to the currently insured, then it is supposed that they will supplement their NHI coverage through the purchase of additional private insurance. Therefore, the two factors influencing the increase in service demands under the NHI 1 scenario are the fraction of a State's population which is insured before the institution of NHI, and the difference between the insured and uninsured populations' demands for health care services.

The NHI 1 scenario would only reduce the price of care to the uninsured population by insuring them at the coinsurance rates experienced by the insured populations. That is, after the institution of NHI, the average coinsurance rates of those in all States is expected to be about 5 percent for the hospital inpatient and 27 percent for ambulatory care.[3] The NHI 2 scenario assumes that essentially "free care" would be provided to both the insured and uninsured populations, thus reducing the average copayment of the insured population from 5 percent for the inpatient services and 27 percent for ambulatory services to zero. The price of care for the uninsured population who pay the total price for these services would also be reduced to zero.

National Health Insurance Results

Overall, in the baseline case the 1985 national requirement for RNs increased by 145 percent over the base year requirement. Under NHI 1 this increase in requirements is 154 percent. Thus, the effect of NHI 1 is a 9-percent national increase in nurse requirements over the projection period (see table 2). This represents approximately 62,000 additional FTE RNs in 1985 as a consequence of the enactment of this plan in 1979. For the individual States the increase in RN requirements over the baseline case ranges from zero to 39 percent. All but five States fall within the range of 4 to 20 percent.[4] Of these five States, Washington State and Washington, D.C. are expected to experience increases in nurse requirements of only zero and 1 percent above the baseline case, and Nevada, Arizona, and Alaska are expected to experience increases of 23, 26, and 39 percent in RN requirements over the baseline scenario.

Small increases are anticipated in Washington State because 95 percent of the population already have hospital insurance and 73 percent have ambulatory insurance. In addition, in terms of the 1985 service demands, doctor's office, hospital inpatient, and hospital outpatient visits are expected to be only 35 percent, 78 percent, and 44 percent of their levels, respectively, with a dramatic increase in HMO clinic visits of nearly 200 percent.[5] In

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[3] See discussion of national health insurance in appendix B.

[4] See table B-13 of appendix B.

[5] See table B-5 of appendix B.

Table 2.—Comparison of 1985 FTE RN requirements under NHI and baseline scenarios

State	Difference in percent of 1972 RN work force		Difference in 1985 RN requirements	
	NHI 1	NHI 2	NHI 1	NHI 2
Alabama	11	20	871	1,558
Alaska	39	54	436	600
Arizona	26	37	1,858	2,647
Arkansas	17	28	611	996
California	4	11	3,051	7,591
Colorado	10	19	932	1,846
Connecticut	8	16	1,141	2,186
Delaware	6	18	136	430
District of Columbia	1	3	80	151
Florida	15	27	3,640	6,459
Georgia	11	21	1,306	2,583
Hawaii	8	19	229	552
Idaho	20	34	406	707
Illinois	6	16	2,770	6,722
Indiana	11	25	1,657	3,706
Iowa	9	21	890	2,116
Kansas	11	24	866	1,797
Kentucky	13	23	936	1,595
Louisiana	19	29	1,590	2,428
Maine	6	13	244	557
Maryland	16	24	2,153	3,309
Massachusetts	6	12	2,011	3,672
Michigan	6	16	1,678	4,307
Minnesota	10	16	1,444	2,502
Mississippi	15	26	727	1,243
Missouri	7	15	911	2,069
Montana	16	29	422	777
Nebraska	7	17	426	992
Nevada	23	37	368	587
New Hampshire	13	21	463	790
New Jersey	9	18	2,415	4,927
New Mexico	18	29	505	806
New York	4	8	2,611	6,296
North Carolina	18	30	2,721	4,478
North Dakota	10	20	219	463
Ohio	7	19	2,658	6,888
Oklahoma	13	24	760	1,413
Oregon	15	27	1,148	2,017
Pennsylvania	4	12	2,322	6,108
Rhode Island	4	9	170	362
South Carolina	16	30	1,089	2,023
South Dakota	11	24	288	597
Tennessee	11	19	987	1,770
Texas	16	27	4,389	7,557
Utah	19	29	592	904
Vermont	12	20	266	454
Virginia	19	29	2,793	4,321
Washington	0	1	63	139
West Virginia	5	13	260	692
Wisconsin	7	15	1,051	2,275
Wyoming	15	28	179	333
United States	9	17	61,739	122,293

fact this high growth rate for Washington State in the baseline case essentially removes most of the impact pressures for any of the health system changes under investigation. The limited impact on Washington, D.C. is attributable to the estimate which indicated its entire population was insured for both hospital and ambulatory services prior to the assumed 1979 enactment of NHI.[6]

In Nevada, Arizona, and Alaska, much smaller proportions of the population were estimated to have hospital insurance, and 34 percent had ambulatory insurance before the institution of NHI.[6] Although these estimates of the percent impact attributable to NHI appear to be high, their impact in terms of numbers of RNs may be relatively small. The combined NHI 1 impact on RN requirements for two of these States—Nevada and Alaska—is only about 800 RNs, or about 1 percent of the total estimated 63,000 additional FTE RNs required as a consequence of the NHI 1 program. The NHI 1 impact in Arizona alone, however, is over 1,800 FTE RNs, and there are 12 States projected to have an even greater incremental impact, with the maximum impact of nearly 4,400 additional RNs required in Texas (see table 2).

For the NHI 2 scenario, table 2 shows that the impacts are greater in magnitude but are similar in distribution to those projected for NHI 1 for the baseline case, the 1985 national requirement for RNs. Under NHI 2, 162 percent of FTE 1972 nurses positions are estimated to be required in 1985. The NHI 2 would result in an increment of 17 percent more nurses required than would have been required in the absence of such a program. As a consequence of this program about 122,000 additional FTE RNs are required in 1985 relative to the 1985 baseline projection. This is almost double the impact projected under the NHI 1 scenario.

For the individual States, the growth in 1985 RN requirements above the baseline case ranges from zero to 54 percent, with all but five States between 8 and 35 percent. Outside this range were the same States which provided the extreme cases under NHI 1 (i.e., Washington State and Washington, D.C., with differences in growth above the baseline of 1 and 3 percent, and Nevada, Arizona, and Alaska with 37-, 37-, and 54-percent increments over the baseline scenario). These extremes arise for the same reasons that they do in NHI 1.

As in the case for NHI 1, Texas is projected to experience the greatest NHI 2 impact in terms of the absolute number of additional RNs required (7,557 RNs). This estimate is much greater than the average impact of 2,398 estimated for all States. A total of 18 States are higher than this average, reflecting the combined effect of low insurance coverage and large populations of RNs relative to the remaining States.

The Impact of Health Maintenance Organization Enrollment

There are three factors which affect the impact of HMO enrollment on future nurse requirements—the rate of HMO enrollment growth, the degree to which the *per capita* demands of HMO enrollees differ from those of the rest of the population, and differences in the nursing resources used to meet these demands. Persons in HMOs utilize about half as many inpatient services *per capita* as members of the general population and about three-fourths the number of ambulatory visits *per capita*. Thus, an increase in HMO enrollment results in a decrease in inpatient days and subsequently in nurse requirements in the inpatient setting. Also, it is assumed that HMO enrollees will seek ambulatory care in HMO clinics rather than in the more traditional physician's office or outpatient settings. An increase in HMO enrollment, therefore, reduces the requirements for nurses in the hospital inpatient, outpatient, and physician's office settings while increasing the requirements for HMO clinic nurses.

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[6] See discussion of national health insurance in appendix B.

In addition, the intensity of nursing care is somewhat higher in HMO clinics than other ambulatory clinics. In fact, analysis of detailed data on several HMOs [Gorby and Associates, 1974] showed that the average number of nurses per ambulatory visit in the base year was higher by nearly one-third in HMO clinics. Since ambulatory utilization *per capita* is about one-fourth smaller in HMOs, an increase in HMO enrollments will result in little or no net change in requirements for nurses to provide ambulatory care, other factors remaining equal. Thus, the net result of increased HMO enrollment is a reduction in RN requirements primarily because of the reduction in the demand for inpatient services and the attendant nursing care.

Health Maintenance Organization Scenarios

The HMO scenarios differ from the baseline scenario only with regard to the establishment of HMOs in the future.[7] In the baseline case, no new HMOs were established after 1974, but HMOs in existence at that time were assumed to continue to grow at historic rates. Under the HMO moderate growth scenario (HMO 1), it is assumed that the rate of increase in the number of new HMOs per quarter will be identical to the average rate experienced between January 1974 and July 1975. Using this average, 34 new HMOs are projected nationwide each year (from 1975 through 1985), with 8.7 percent of the nation's population enrolled in HMOs by 1985.

Under a high-growth scenario (HMO 2) it is assumed that the number of HMOs established each year is primarily constrained by the number of HMOs currently in the formational stage of development. The total number of new HMOs for the Nation is projected to be 65 per year (from 1975 through 1985) by keeping the formational number of HMOs constant at the 1975 average. The percentage of the Nation's population enrolled in HMOs under this scenario would increase from 2.4 percent in 1972 to 10.6 percent in 1985.

The percentage of the State populations enrolled in HMOs varies considerably from one State to the next. As noted previously, the extreme example occurs in Washington State where, under the baseline scenario, the HMO population increases from 42 percent in 1972 to 82 percent in 1985. Under the moderate HMO growth scenario, the 1985 percentage increases to 85 percent, and under the high growth scenario to 88 percent. Thus, for this State, the difference between the 1985 RNs required under the baseline and the HMO scenarios is limited, since the fraction of the 1985 population enrolled in HMOs is nearly the same for all three scenarios.

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[7] As in the baseline scenario, no NHI program is initiated in the HMO scenarios. Also, role reformulation does not gain acceptance but remains at the baseline levels. See appendix B for details.

Health Maintenance Organization Results

As shown in table 3, the projected 1985 national nurse requirement under the HMO 1 scenario was 144 percent of the 1972 requirement, or 1 percent less than that estimated under the baseline scenario (145 percent). For the individual States, the net decreases from the baseline ranged from zero to 5 percent, with all but three States (Hawaii, Idaho, and Wyoming) projected to have decreases of less than 2 percent.[8]

These extremes are due to a greater than average HMO enrollment growth relative to that projected for the baseline case. For Hawaii, the percentage of the population in HMOs in 1985 was 27 percent under the baseline and 31.6 percent under the moderate HMO growth scenario. Idaho and Wyoming were projected under the baseline to have no HMO enrollees in 1985 and about 7 percent enrollment under the moderate HMO growth scenario. These three States however account for only 239 of the 7,103 total reduction in RN requirements projected under this scenario. The States which primarily contributed to the total in these estimates are California (1,180), New York (684), New Jersey (466), and Massachusetts (464), i.e., States with large populations and moderate increases in HMO enrollment over the baseline.

Under the high HMO growth scenario (HMO 2) the results were similar with a greater projected impact. The decreases in projected 1985 RN requirement growth under the high HMO growth scenario, relative to the baseline growth, ranged from zero to 9 percent with an average decrease of 2 percent. All States except Hawaii, Idaho, and Wyoming fell within the range of a zero- to five-percent decrease, and these three States are projected to experience decreases of between 5 and 9 percent. These extremes occur for the same reasons as under the moderate growth scenario. The impact in terms of FTE RNs is relatively small. High HMO enrollment growth results in national requirements projections for about 14,000 fewer RNs in 1985 than would otherwise be required if this HMO growth did not take place.

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[8] Washington, D.C. is also projected to experience a decrease of more than 2 percent. This is attributable to the projected growth in HMO enrollment in this city from 37 to 47 percent of the city's population. However, since these enrollees may come from the surrounding States, this impact is probably inflated.

Table 3.—Comparison of 1985 FTE RN requirements under HMO and baseline scenarios

State	Difference in percent of 1972 RN work force		Difference in 1985 RN requirements	
	HMO 1	HMO 2	HMO 1	HMO 2
Alabama	-1	-1	-29	-54
Alaska	-2	-4	-26	-47
Arizona	0	-1	-37	-61
Arkansas	0	0	0	0
California	-2	-3	-1,180	-2,276
Colorado	0	-1	-56	-109
Connecticut	0	-1	-116	-228
Delaware	0	0	0	0
District of Columbia	-4	-7	-203	-383
Florida	-2	-3	-372	-717
Georgia	-1	-1	-59	-117
Hawaii	-4	-7	-98	-186
Idaho	-4	-8	-89	-171
Illinois	-1	-2	-381	-744
Indiana	-1	-2	-117	-224
Iowa	0	0	-29	-55
Kansas	-1	-1	-26	-52
Kentucky	-1	-1	-42	-81
Louisiana	-1	-2	-79	-155
Maine	-1	-1	-18	-42
Maryland	-1	-2	-148	-290
Massachusetts	-1	-3	-464	-915
Michigan	-1	-2	-257	-502
Minnesota	-1	-2	-180	-356
Mississippi	0	-1	-26	-52
Missouri	-1	-2	-121	-246
Montana	-2	-5	-59	-126
Nebraska	-2	-4	-102	-202
Nevada	0	0	0	0
New Hampshire	0	0	0	0
New Jersey	-2	-4	-466	-908
New Mexico	-1	-1	-17	-30
New York	-1	-1	-684	-1,362
North Carolina	-1	-1	-62	-122
North Dakota	-2	-4	-53	-110
Ohio	-1	-2	-227	-460
Oklahoma	-1	-2	-53	-101
Oregon	-2	-4	-165	-319
Pennsylvania	-1	-1	-297	-587
Rhode Island	-1	-1	-23	-41
South Carolina	0	0	0	0
South Dakota	-2	-4	-49	-99
Tennessee	-1	-2	-78	-158
Texas	-1	-2	-236	-457
Utah	-1	-1	-16	-35
Vermont	-2	-3	-30	-58
Virginia	-1	-1	-55	-117
Washington	-1	-2	-125	-245
West Virginia	-1	-2	-37	-75
Wisconsin	0	-1	-67	-133
Wyoming	-5	-9	-52	-104
United States	-1	-2	-7,103	-13,912

In terms of absolute numbers of 1985 FTE RNs required, the greatest impact of HMO enrollment growth is projected to occur in California and New York with reductions of 2,276 and 1,362 RNs, respectively. This change represents less than a 3-percent reduction for these States relative to the baseline projected increase from 1972 to 1985. Washington State is not shown to have much impact over the baseline case for reasons cited previously. However, the baseline HMO enrollment increases projected for this State clearly indicate the HMOs have the greatest impact in this State over any other. Over 23 percent of the Nation's 1972 HMO enrollment population were concentrated in Washington. Under the baseline scenario this percentage decreased to about 20 percent; however, the percent of the Washington population enrolled in HMOs nearly doubled from 42 percent to 82 percent. Thus, the impact of HMO enrollment on RN requirements is mostly subsumed in the baseline projections.[9]

If the Washington HMO population is combined with those for California and New York, the result accounts for over 80 percent of the Nation's total HMO population in 1972. Under the baseline this combined share of the HMO population is projected to be about 78 percent in 1985, and under the high HMO growth scenario, this becomes about 60 percent. The high growth scenario therefore has the effect of increasing distribution of HMOs across States rather than simply increasing the HMO population in those States with high HMO enrollment. In fact, in the high growth scenario it takes 10 States to account for over 70 percent of the Nation's total 1985 HMO population, whereas only three States were necessary to reach this percentage in the baseline case.

The Impact of a Reformulation in Nursing Roles

Role reformulation in nursing affects RN requirements by increasing the amount of RN services provided in the hospital inpatient and physician office settings. The intensity of these nursing services is increased in the hospital inpatient setting through acceptance of the primary nursing concept and through expanded use of RNs as clinical nurse specialists.[10] In the physician's office, the use of RNs in practitioner roles leads to an increase in the number of RNs required in this practice setting.

The impact of primary nursing is dependent upon the fraction of hospital inpatient units that adopt the primary nursing concept, and the productivity of RNs versus that for LPNs and aides.[11] Increased numbers of clinical nurse specialists increase the requirements for RNs in direct proportion to the time these specialists spend performing new nursing functions as opposed to more traditional RN tasks. An increase in the number of nurse practitioners in physician offices or in the number of nurses assuming this role is dependent on the degree to which their services are used to complement or supplement the traditional office services, thus alleviating the excess demand for these services. In this study, excess demand for these services is dependent on the load a physician and his staff can profitably handle. RNs in nurse practitioner roles are assumed to assist with satisfying any demand for services which exceed this profitable limit.

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[9] This situation is primarily the consequence of the desire to develop a model which treated all States in the same manner. In terms of HMO enrollment, Washington State may not be amenable to this "standard" approach.

[10] A more detailed description of role reformulation is provided in chapter 4 of the earlier report (VRI, 1976) and appendix B in this part.

[11] Productivity is assumed in the analysis to be proportional to the relative wages of these personnel.

Role Reformulation Scenarios

In the role reformulation scenarios, health insurance and HMO growth parameters were maintained at the levels used in the baseline scenario. That is, no form of national health insurance is introduced in these scenarios, and no new HMOs are established, although those in existence as of 1974 continue to grow at historic rates.

The role reformulation parameters were changed from the baseline case to isolate the effects of role reformulation acceptance on RN requirements. In the baseline scenario it was assumed that 3 percent of inpatient units in the country would utilize primary nursing and that this percentage would remain constant throughout the projection period. For the moderate acceptance scenario (RR 1) this percentage grows linearly to 40 percent in 1985, and for the high acceptance scenario (RR 2), 80 percent of all hospital inpatient units employ primary nursing concepts by 1985. Further, in the baseline case no clinical nurse specialists (CNSs) were used in new roles; however, for the moderate acceptance scenario, 75 percent of CNSs would be in new roles by 1985, and for the high growth scenario all CNSs would be in new roles by 1985.[12] Finally, the degree to which demand for physician's services in office visits are satisfied by nurses in practitioner roles is held fixed at 20 percent in the baseline,[13] but grows linearly to 65 percent under the moderate role reformulation acceptance scenario and to 100 percent in the high acceptance scenario.[14]

Role Reformulation Results

The differences between the results of the moderate acceptance scenario and the projections of the baseline case ranged from −1 percent to 26 percent, with a national average difference of 4 percent (see table 4). Most increases, relative to the baseline, were between zero and 18 percent, with six States outside this range. Differences in these projected impacts are primarily due to differences in the intensity of hospital RN services from one State to the next since most of the impact is attributable to acceptance of primary nursing. For the entire Nation, primary nursing was responsible for over 70 percent of the increase re-

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[12] Although the assumptions on the fraction of CNSs in new roles are not very conservative, the impact of these assumptions about this form of role reformulation is limited (see section appendix B).

[13] This baseline level was chosen since it produced the approximate number of RNs in practitioner roles in 1975.

[14] Table B-17 in appendix B provides a summary of the role reformulation parameter values for each scenario.

Table 4.—Comparison of 1985 FTE RN requirements under role reformulation and baseline scenarios

State	Difference in percent of 1972 RN work force		Difference in 1985 RN requirements	
	RR 1	RR 2	RR 1	RR 2
Alabama	16	32	1,236	2,451
Alaska	0	0	2	2
Arizona	5	10	374	694
Arkansas	26	51	913	1,815
California	1	2	604	1,060
Colorado	1	2	106	171
Connecticut	2	2	162	293
Delaware	2	5	59	112
District of Columbia	0	0	21	36
Florida	9	17	2,174	4,118
Georgia	12	24	1,472	2,893
Hawaii	0	0	7	8
Idaho	7	12	129	249
Illinois	2	3	777	1,458
Indiana	6	12	900	1,749
Iowa	4	7	355	689
Kansas	7	15	568	1,124
Kentucky	12	24	842	1,668
Louisiana	15	30	1,263	2,499
Maine	16	31	649	1,293
Maryland	−1	−4	−229	−532
Massachusetts	−1	−3	−490	−1,049
Michigan	6	12	1,558	3,053
Minnesota	3	5	377	734
Mississippi	19	37	888	1,766
Missouri	10	20	1,394	2,732
Montana	4	9	124	235
Nebraska	5	11	322	636
Nevada	10	20	162	310
New Hampshire	0	0	1	−15
New Jersey	0	1	173	283
New Mexico	8	15	215	420
New York	1	2	759	1,317
North Carolina	8	15	1,134	2,230
North Dakota	7	13	148	293
Ohio	4	8	1,456	2,845
Oklahoma	17	34	1,001	1,986
Oregon	1	2	88	161
Pennsylvania	0	1	232	297
Rhode Island	0	0	9	7
South Carolina	9	18	615	1,214
South Dakota	5	10	126	249
Tennessee	18	36	1,655	3,281
Texas	15	30	4,229	8,336
Utah	3	5	86	155
Vermont	0	0	5	5
Virginia	5	10	777	1,506
Washington	−1	−1	−33	−96
West Virginia	9	19	507	1,006
Wisconsin	5	9	708	1,380
Wyoming	3	6	37	72
United States	4	8	30,649	59,199

sulting from moderate acceptance of the role reformulation analyzed.

The institution of primary nursing tends to establish a fixed, and generally higher, ratio of RNs to other nursing personnel (LPNs and aides) employed in the hospital inpatient setting; thus, States with lower RN/LPN ratios in this setting should experience greater increases in RN requirements with adoption of primary nursing. For example, the national ratio of RNs to LPNs providing hospital inpatient care in 1972 [15] was 2.0 in 1972, whereas the Arkansas, Mississippi, and Tennessee RN/LPN ratios were all less than 1.0. The acceptance of primary nursing thus accounted for nearly all of the additional RN requirements in these States, i.e., the additional 26 percent for Arkansas, 19 percent for Mississippi, and 18 percent for Tennessee over the baseline case. States with higher RN/LPN ratios in 1972 are not projected to experience large increases in RN requirements as role reformulation gains acceptance. For example, Maryland and Massachusetts,[16] with hospital inpatient RN/LPN ratios near 3.0, are projected to have fewer 1985 RN requirements than projected in the baseline case. These reductions although minor, reflect the assumption that adoption of primary nursing in these States will resemble that already instituted elsewhere and consequently reduce the average amount of RN services per patient day. If alternative forms of primary nursing are adopted by these States, then this reduction would not necessarily occur.[17]

Under the high acceptance scenario, the impact of role reformulation was substantially greater. The differences in projected 1985 RN requirements between the baseline and high role reformulation acceptance scenarios ranged from −4 to 51 percent, with an average increase of 8 percent. All but six States experienced projected increases of from zero to 34 percent. Again, Maryland, Massachusetts, and Washington State all experienced decreases in RN requirements relative to the baseline; with 4-, 3-, and 1-percent decreases, respectively. Arkansas, Mississippi, and Tennessee experienced significant increases in future RN requirements as the result of the institution of role reformulation. For these States, the 1985 RN requirements were estimated as greater than the baseline case by 51, 37, and 36 percent of the 1972 level, respectively. The reasons for these extreme cases are the same as those presented earlier for the moderate scenario.

The high acceptance of role reformulation resulted in a projected national increase of over 59,000 more FTE RNs in 1985 than estimated in the baseline case. Ten States (Texas, Florida, Tennessee, Michigan, Ohio, Missouri, Louisiana, Alabama, North Carolina, and Oklahoma) together, account for over half (32,915) of the total national increase. Of the three States which experienced the greatest percentage increases in RN requirements

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[15] This is the ratio of FTE RNs to FTE LPNs employed in the Department of Nursing Service in AHA-registered short-term general hospitals [Bureau of Health Resources Development, 1974b].

[16] Washington State also experienced a slight drop in RN requirements with moderate acceptance of role reformulation which is attributable to the combined reduction in inpatient days of the HMO enrollees and an above-average RN/LPN ratio in inpatient care.

[17] See appendix B for details concerning the primary nursing analysis.

(Tennessee, Mississippi, and Arkansas), only Tennessee ranks with the States which significantly contribute to the total number of additional RNs required under this scenario.

Finally, it should be noted that the moderate and high acceptance role reformulation scenarios result in approximately one-half the national impact projected for the moderate (NHI 1) and high (NHI 2) benefit NHI plans, respectively. However, a comparison of the results in tables 2 and 3 reveals that the distribution of impact across the States is quite different under these two different types of health system changes.

The Impact of Combined System Changes

Since the impact of a combination of health system changes is not necessarily the sum of the impacts of the individual factors, this section presents the results of analyzing the impacts of several combinations of health system changes. The analysis [VRI, 1976] of combined impact on the Nation's requirement for RNs found that synergistic effects arise because of interactions between health system changes. Most significant of these was the interaction between NHI and role reformulation. This occurred for two reasons. First, both NHI and role reformulation have considerable impact on the same health care settings—the short-term hospital inpatient and physician office settings. Second, NHI is capable of producing significant changes in health service utilization, thereby stressing the current system's capability to provide these services and stimulating the need for nurses in reformulated roles. This is particularly true in the physician office settings, where NHI creates demands for office visits which exceed the ability of the projected physician labor force, who are then likely to turn to personnel in extended roles to satisfy these excessive service demands.

Combination Scenarios

To investigate the impact of various combinations of health care system changes, two scenarios were defined in terms of the conditions of the previous scenarios. The moderate scenario (Comb 1) consists of the NHI 1 scenario with moderate HMO growth and moderate acceptance of role reformulation concepts. The high combination scenario (Comb 1) consists of the less conservative scenarios for each of the three health care systems changes. Included in this scenario are the institution of the NHI 2 health insurance program, the high growth in HMO enrollment, and the high acceptance of role reformulation concepts.

Combination Results

Table 5 shows that the 1985 national RN requirement under the Comb 1 scenario was higher than in the baseline case by 13 percent of the 1972 national RN requirement. This results in approximately 92,000 more FTE RNs required in 1985 than in the baseline scenario. For the individual States, the differences in

Table 5.—Comparison of 1985 FTE RN requirements under combination and baseline scenarios

State	Difference in percent of 1972 RN work force		Difference in 1985 RN requirements	
	Comb. 1	Comb. 2	Comb. 1	Comb. 2
Alabama	29	68	2,264	5,157
Alaska	37	55	416	614
Arizona	35	67	2,527	4,849
Arkansas	49	107	1,736	3,837
California	4	10	2,440	7,040
Colorado	11	30	1,094	2,896
Connecticut	9	23	1,252	3,226
Delaware	9	31	205	749
District of Columbia	−2	−5	−116	−267
Florida	27	65	6,377	15,438
Georgia	25	62	3,042	7,499
Hawaii	4	13	123	369
Idaho	23	44	465	920
Illinois	8	24	3,335	9,966
Indiana	17	44	2,483	6,530
Iowa	13	33	1,267	3,380
Kansas	19	46	1,468	3,479
Kentucky	27	60	1,867	4,207
Louisiana	38	78	3,143	6,479
Maine	21	50	891	2,053
Maryland	14	30	1,931	4,052
Massachusetts	3	9	1,076	2,734
Michigan	12	33	3,069	8,678
Minnesota	12	26	1,739	4,049
Mississippi	36	78	1,725	3,748
Missouri	16	41	2,262	5,703
Montana	19	39	510	1,043
Nebraska	11	30	631	1,721
Nevada	39	85	613	1,319
New Hampshire	14	30	505	1,120
New Jersey	8	22	2,155	5,933
New Mexico	28	59	790	1,656
New York	4	11	2,689	8,701
North Carolina	29	62	4,241	9,071
North Dakota	13	32	308	739
Ohio	11	33	4,041	11,848
Oklahoma	31	73	1,850	4,278
Oregon	14	30	1,064	2,233
Pennsylvania	4	15	2,364	7,764
Rhode Island	4	13	163	515
South Carolina	28	65	1,911	4,472
South Dakota	14	33	355	832
Tennessee	30	70	2,772	6,360
Texas	34	78	9,431	21,468
Utah	24	48	729	1,493
Vermont	11	23	248	532
Virginia	27	57	3,972	8,279
Washington	−1	−3	−106	−262
West Virginia	14	36	740	1,876
Wisconsin	12	30	1,774	4,663
Wyoming	13	26	158	316
United States	13	32	91,986	225,354

1985 RN requirements, relative to the baseline, ranged from −2 percent to 49 percent of the 1972 RN requirements. Most States experienced expected increases of from 3 to 35 percent, with six States outside this range.

The 1985 RN requirements for Washington State and Washington, D. C. are projected to be slightly below the baseline, and the requirement for Alaska, Louisiana, Nevada, and Arkansas above the baseline by 37, 38, 39, and 49 percent, respectively. Washington State and Washington, D.C. which were projected to have minimal, if any, impact as a consequence of NHI, HMO growth, and role reformulation scenarios, are projected to experience minimal impact under the first combination scenario. Alaska, Louisiana, Nevada, and Arkansas, which were projected to experience large increases in RN requirements in the individual scenarios, have an even greater impact under this combination scenario. The synergistic effect for Arkansas, for example, results in requirements for over 200 additional FTE RNs not projected for 1985 under the individual scenarios.[18]

Under the second combination scenario, the 1985 RN requirement for the Nation was higher than in the baseline case by 32 percent of the 1972 national RN requirement. This translates into 225, 354 more FTE RNs in 1985 than anticipated in the baseline case. For the individual States the differences in 1985 RN requirements, relative to the baseline, ranged from −5 to 107 percent, with all but seven States between 9 and 73 percent. Washington State and Washington, D.C. experienced decreases of 3 and 5 percent, respectively, and Texas, Missouri, Louisiana, Nevada, and Arkansas experienced increases of 78, 78, 78, 85, and 107 percent, respectively.

The results under this scenario show significant interactions among the system changes in terms of the impact on RN requirements. For example, the summed effects of NHI 2, high HMO enrollment growth, and high role reformulation acceptance is estimated to result in a 1985 national RN requirement for about 167,000 nurses above the 1985 projected baseline levels. The combined impact of these changes is, however, much greater, resulting in a projected 1985 RN requirement over the baseline of over 225,000 nurses.[19]

The most dramatic influence is in the physician office setting. Here, the individual effects of the NHI 2, HMO 2 and RR 2 scenarios sum to a 1985 national requirement for an additional 76,000 nurses in this setting above the baseline case. In the Comb 2 scenario, the impact in this setting is projected to nearly double (132,000) accounting for more than half of the over 225,000 additional nurses required in 1985 (see table 5), as a consequence of the combined effects of the health system changes.

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[18] The addition of Arkansas' 1985 FTE RNs under the NHI 1, HMO 1, and RR 1 scenarios exceeds the baseline case by 1,524 RNs. The comparable figure from table 5 is 1,736.

[19] For some States the synergistic effects are much greater. In Arkansas, for example, summed effects = 1985 requirements of 245 percent of 1972 requirements, but in combination: 1985 requirements = 273 percent of 1972 requirements.

Appendix A

THE VRI STATE NURSE REQUIREMENTS MODEL

The VRI State model is very similar in structure to the national model (see [VRI, 1976, appendix A]). That is, it contains the same three major modules—the population module, the demand-for-services module, and the nurse manpower requirements module (see figure A-1). Furthermore, each module of the State model contains a set of submodels which are similar in mathematical structure to those in the national model. There are, however, a number of differences between the national and State models which reflect the introduction of State-specific parameters into the model and the difference in the availability of national and State-level data to estimate the values of model parameters. Since these differences are not always minor, a description of the State model follows. Much of the material presented here is also found in the description of the national model.

As for the national model, the complete specification of the State model requires volumes of detailed data and analyses which are far too extensive to reproduce here in their entirety. Since the main emphasis of the study is on the results obtained and their interpretation, a brief description of the State model is presented below. This abbreviated description indicates the inputs and outputs for each submodel and displays a general symbolic representation [1] of the functional relationship between these quantities. In the interest of keeping this description brief, only key assumptions and major data sources are discussed in this appendix. Appendix B provides a more complete description of model parameter values and their estimation within the context of selected model scenarios.

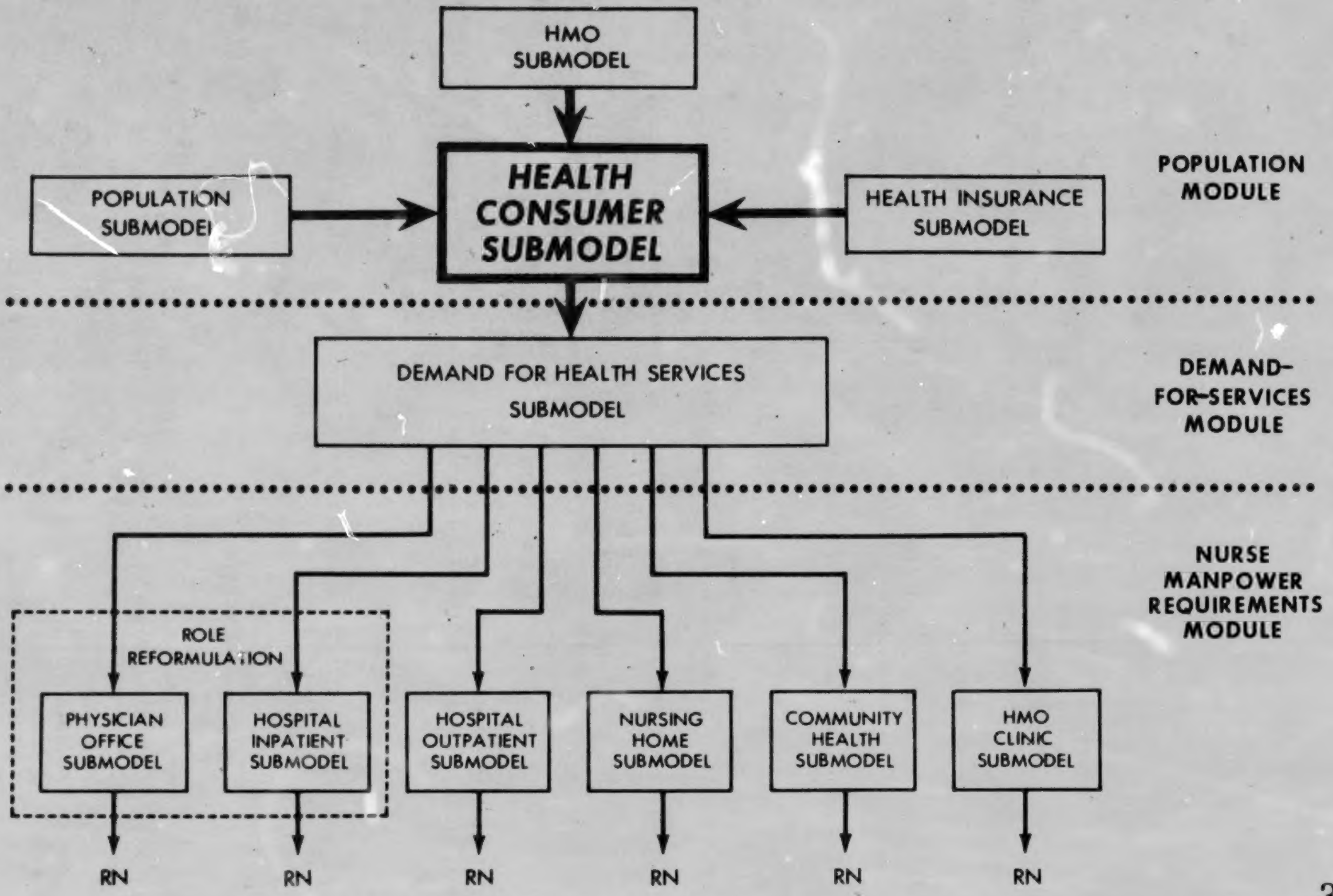
Population Module

The population module estimates and characterizes the future population of each State and the District of Columbia. Each of the submodels in this module are described individually below.

Population Submodel

The population submodel provides estimates of State populations over the 1972-1985 time frame for 10 age/sex groupings. The age groups chosen (0-16, 17-24, 25-44, 45-64, and 65+) correspond to those used in the previous analysis of future RN requirements for the Nation which were chosen to permit use of health service utilization data available from the National Center for Health Statistics.

[1] This functional form may in actuality represent one or more detailed equations or data matrices.


HMO SUBMODEL
POPULATION SUBMODEL
HEALTH CONSUMER SUBMODEL
HEALTH INSURANCE SUBMODEL
POPULATION MODULE
DEMAND FOR HEALTH SERVICES SUBMODEL
DEMAND-FOR-SERVICES MODULE
NURSE MANPOWER REQUIREMENTS MODULE
ROLE REFORMULATION
PHYSICIAN OFFICE SUBMODEL
HOSPITAL INPATIENT SUBMODEL
HOSPITAL OUTPATIENT SUBMODEL
NURSING HOME SUBMODEL
COMMUNITY HEALTH SUBMODEL
HMO CLINIC SUBMODEL
RN
RN
RN
RN
RN
RN

Since the Bureau of Census does not provide estimates of future State populations by age and sex, the State population model relies on extrapolations and/or interpolations of census publications found in the Current Population Reports series.[2] Census Bureau estimates of future total State populations which were based on long-term trends (1950–1970) were combined with more recent 4-year trends and the State age/sex distributions for individual years to estimate the future age composition of State populations. That is, two projections of State populations were made, one based on the long-term trends and the other on recent experience, and then averaged. The resultant estimates were then normalized to correspond to the Series II national population projections and corrected to represent the civilian population.

The sex distribution by State was assumed to be the same as in the 1970 census. However, these values were normalized for each year by the Series II national male-female mix. This distribution has traditionally changed rather slowly. The age distribution is projected as a linear trend proportional to the 1970 through 1974 changes, by State. This linear-trend assumption would hold exactly if the population of each State were uniformly distributed across all ages that cross group boundaries during the period of the projection. This linearity assumption was tested and found to be quite reasonable.

HMO Submodel

This submodel projects the number of persons enrolled in HMOs for each State by age and sex, in year t (measured from 1972). The general form of the model may be summarized as follows:

$$E_{i,s}(t) = f_{i,s}\text{[illegible]}) \left[E_0(t) + \sum_{n} (1 + R_n) \cdot E_n(t-1) \right],$$

where

$E_{i,s}(t)$ = total number of persons in age/sex cohort i enrolled in HMOs in year t;

$f_{i,s}(t)$ = fraction of enrollees in age/sex group i and State s in year t;

$E_0(t)$ = number of enrollees in newly formed HMOs;

$E_n(t-1)$ = number of the previous years (t−1) enrollees in HMOs which have been operational for n years (with $n \geq 1$); and

R_n = rate of increase in enrollment of HMOs which have been operational for n years.

The total number of enrollees is the sum of enrollees in existing HMOs (enrolling from the previous years, $E_n(t-1)$ times the HMO growth rate, R_n) and enrollees in newly formed HMOs, $E_0(t)$. Analysis of data in Wetherville and Nordby [1975] indicates the rate of growth, R_n, in enrollment of a given HMO declines in roughly a negative exponential fashion with the age of the HMO.

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[2] See, for example, Bureau of Census [1972a, 1972b, 1974, and 1975].

This rate of growth is assumed identical for all States. Since the number of new HMOs to become operational in any future year is unknown and since prediction of the States where they are to become operational is even more speculative, the model distributes the total national enrollment in newly formed HMOs, $E_o(t)$, across States in proportion to the number of HMOs in each State in the formational or planning stage as of July 1, 1975. This method has a somewhat averaging effect, in that it would tend to smooth out the impact of HMOs' growth in nurse requirements across a number of States. Actual numbers of HMOs and enrollees are used through 1974 because data is available for those years [Wetherville and Nordby, 1975].

$E_n(t)$ is determined from the number of HMOs operational in year t (which in turn is projected as a function of a scenario variable indicating the number of new HMOs each year and their enrollment, $E_o(t)$). Finally, values of $f_{i,s}(t)$ are approximately the fraction of individuals in each age, sex group [3] for each State times the fraction of the national HMO enrollment in that State.

The Health Insurance Submodel

The health insurance submodel is an empirical model describing both the current and future extent of health insurance coverage by State. The measure of insurance coverage chosen was the average coinsurance rate [4] by setting, over the population of each State. This measure, while far from satisfactory, is the best that can be done with the available data. It was estimated as follows:

$$\bar{c}_s = P_s \cdot c + (1.0 - P_s),$$

where

$\bar{c}_s$ = the average coinsurance rate for State s;
P_s = the fraction of the population of State s that is insured; and
c = the national average coinsurance rate of the insured population.

The key assumptions of this submodel are that the insured fraction of the population can be determined, and that the insured population of any State is covered to the same extent [5] as the national average. While far from ideal, there are limited data which reflect the extent of insurance coverage, by State, and limited reliable data on the distribution of the insured population among the States. In addition, the lack of utilization data by State as a function of insurance coverage made any further refinements in this estimate inappropriate.

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[3] Minor adjustments are made in this proportion to reflect an analysis of data from Gorby and Associates [1974] which show the elderly (>65) are less likely to enroll in HMOs.

[4] Defined as the ratio of the out-of-pocket expenses of the population to the total health care expenditures of the population.

[5] As measured by coinsurance rates.

Demand-for-Services Section

This section performs the function of computing the projected demand for health services in each of the six settings shown in figure A–1 for each year of the projection period. It does this by applying a large array of *per capita* demand estimates to the numbers of individuals estimated in the population section. For a given cohort and service setting, this is done as follows for the non-HMO population:

$$D_{ijs}(t) = G(t) \cdot N_{is}(t) \cdot [d_{ijs} + I_s],$$

where

$D_{ijs}(t)$ = total units of service demanded by the non-HMO population in age/sex group i in health care service setting j located in State s in year t;

d_{ijs} = the per capita demand for services in setting j by age/sex group in State s;

$N_{is}(t)$ = the non-HMO population in age/sex group i, State s and year t;

$G(t)$ = the growth coefficient for services in setting j in year t; and

I_s = the national health insurance coefficient for State s.

Values for these parameters are derived under a number of assumptions.[6] The *per capita* demands, d, were derived from national data sources such as NCHS and AHA which provided State-level data on health services utilization and the census data on State-level populations. These *per capita* demands were adjusted to reflect the demands of the non-HMO population. The cohort population, $N_{is}(t)$, is the difference between the total estimated population and the HMO populations as estimated by the HMO submodels, respectively. Using this population assumes that persons in State s only use services provided in State s. This assumption should cause only minor error except in the case of certain States (e.g., New Jersey, Connecticut, and the District of Columbia).

The growth coefficient, G, is included to allow the *per capita* demands to change as a function of time. This growth is assumed to be constant for all States.[7] It is obtained from a linear growth curve of the form

$$G(t) = 1.0 + g \cdot t,$$

where

t = time in years from the base year, and

g = the annual projected growth rate from the base year.

The NHI coefficient, I_s, is included to reflect the impact of NHI on demands for services and is estimated as follows:

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[6] A more detailed description of these assumptions and the values of these model parameters is provided in appendix B.

[7] An investigation of available data on State-level *per capita* demand growth rate revealed that the number of data points and sample sizes were too small to produce estimates of these rates with any reasonable degree of confidence.

$$I_s = m\,(\bar{c}_i - \bar{c}_s),$$

where

m = the slope of a linear, price-versus-quantity demand curve;

$\bar{c}_i$ = the average coinsurance rate in effect after NHI; and

$\bar{c}_s$ = the average coinsurance rate in effect prior to NHI for State s.

Values of $\bar{c}_i$ are input to the NHI submodel, and values for $\bar{c}_s$ are estimated as discussed in appendix B. Values of m are derived from available empirical data as discussed in appendix B. In applying this model we have made the assumption that the insured and uninsured populations behave similarly with respect to price, and that the experimental data on which m is based apply to prices and service quantities outside the range of experimental values. Although there clearly are examples of adverse selection (i.e., persons most likely to require health care insuring themselves) and inequity (i.e., persons unable to afford insurance whose demands for care differ from those experienced by the insured population), this commonly adapted assumption is dictated by limitation in data availability.

For the HMO population, the demand-for-services model is very similar to that for the general population. This model has the form

$$D_{ijs} = G(t) \cdot E_{is}(t) \cdot \alpha \cdot d_{ijs},$$

where

D_{ijs} = total units of service demanded by the HMO population in age/sex group i, in health care setting j, located in State s,

d_{ijs} = per capita demand by age/sex group i for service in setting j located in State s,

$E_{is}(t)$ = the HMO enrollment in State s by age/sex group i at time t,

α = the estimated ratio of HMO to non-HMO *per capita* demands, and

$G(t)$ = the service growth coefficient described above.

Values for P are obtained from the HMO submodel and are the estimated HMO population by age and sex. Values of α are estimated as discussed in appendix B. Finally, it should be noted that NHI coefficient is absent in this model component—a result of the model assumption that persons electing to join an HMO prior to NHI will continue to do so afterward.

The Nurse Requirements Module

The nurse requirements module uses the aggregate health service demands projected in the previous module to estimate the requirements for nurses in several practice settings. The requirements for nurses in those settings which do not rely on the service demands estimated in the previous module are also estimated in this model section. Finally, the impact of role reformulation is also computed in the nurse requirements module. Each of the six submodels which estimate nurse requirements are discussed individually, below.

The Physician Office Submodel

This submodel requires as input the total annual number of physician visits in each State in each year of the projection period. The key assumptions of this submodel are that the supply of physicians can be determined, and that the major determinant of nurse employment in physicians' offices is the ratio of the number of visits demanded in the future to the number of physicians available to provide these services. It has the following symbolic structure:

$$RN_{1s}(t) = \sum_{q} f_q(t) \cdot A_{qs}(t) \cdot (1 + \beta t)P_{qs},$$

where

$RN_{1s}(t)$ = number of FTE RNs employed in physicians' offices in State s in year t;

P_{qs} = number of physicians in private practice type q [8] in State s in 1972 which is obtained from *Distribution of Physicians in the United States, 1972* [AMA, 1973];

β = growth rate of physician entering private practice (assumed to be identical for all States) which results in about a 1.5 percent growth per year;

$f_{qs}(t)$ = fraction of nonphysician personnel in physician offices that are RNs. Values of the parameter were adjusted so that 1972 model output would agree with 1972 RN inventory data by State [American Nurses' Association, 1974b]. Most adjustments were within 20 percent of the national average (see American Medical Association, [1973]); and

$A_{qs}(t)$ = number of nonphysician personnel employed per physician in State s determined as a function of the number of visits per physician in private practice type q.

The number of nonphysician personnel employed per physician, $A_{qs}(t)$, was determined by using production functions developed by Reinhardt, [1970] [9] which is of the general form:

$$V_{qs}(t) = e^{bA_{qs}(t) + dA^2_{qs}(t) + K_q},$$

---

[8] Five types of office practice treated by the model are: general practice, obstetrics and gynecology, pediatrics, internal medicine and other medical specialties, and surgery and other surgical specialties. Specifically excluded from the models are anesthesiologist's, psychiatrist's, and radiologist's practices, since they employ relatively few nurses.

[9] Other production functions of the physician's office have been developed, including those developed by Kimbell [1974] and Kimbell and Lorant, [1973]. Since the former uses weekly patient visits (including hospital visits) as the output measure and the latter employs gross revenue as the output measure, their production functions cannot be used directly for our purposes. However, a separate study using comparable output measures [Kimbell and Dean, 1974] found that the different production functions produced similar results.

where

$V_{qs}(t)$ = average number of visits demanded per week in private practice type q for year t;[10]

$A_{qs}(t)$ = number of nonphysician employees per physician (noted above);

b and d = production function coefficients calculated using national data by Reinhardt; and

K_q = constant which determines the number of visits a physician in practice type q can provide without employees.

The physician office submodel also determines the effects of role reformulation in this setting. In the physician office, the incentive for role reformulation is assumed to occur when physicians cannot satisfy the demand for their services by increasing their hours or by economically employing additional nonphysician personnel. The remaining unsatisfied visits are assumed to be met by extender personnel, a fraction of whom are nurses. The number of such nurse extender personnel required is determined from

$$RN^*_{1s}(t) = RN_{1s}(t) + \sum r \cdot EPV_q \cdot V^*_{qs}(t),$$

where

$RN^*_{1s}(t)$ = number of FTE RNs and RN extender personnel in physician offices in State s in year t.

$RN_{1s}(t)$ = number of FTE RNs in physician offices in year t.

r = fraction of FTE extender personnel (EP) who are nurses. This variable is specified as an input parameter since its value depends on many factors (e.g., the future supply of nurse practitioners, the future supply of physician's assistants, and changes in physician reimbursement policies: all of which depend on Federal policy actions).

EPV_q = number of FTE extender personnel employed per visit in type q office practices which is derived from a number of sources [11] which measure the productivity of extender personnel in physicians' offices. These productivity estimates are assumed to be identical for all States.

$V^*_{qs}(t)$ = number of physician office visits in year (t) and State s satisfied by nonphysician (extender) personnel. The value of this parameter is dependent on the difference between the number of visits demanded in a type of practice and an estimate of the maximum number of visits a physician can profitably [12] supply without extender personnel.

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[10] The number of visits is established in a manner which would predict a number of RNs in physicians' offices in 1972 that equaled that documented in the ANA inventory. Values for subsequent years use same proportionality constants to convert total visits demanded into $V_{qs}(t)$.

[11] See Pondy [1972], Smith, Miller, and Gallady [1972], and Schiff, Fraser, and Walters [1969].

[12] The analysis by Reinhardt [1970] indicates that physicians can profitably utilize no more than four nonextender employees. If we assume that physicians have at most four employees, Reinhardt's production function can be used to estimate the number of visits that can (or possibly should) be supplied by a physician in a type of office practice. Using this approach, for example, a general practitioner would provide no more than about 220 visits per week in 1972, where the Medical Economics [1973] survey shows that about 10 percent of the general practitioners exceed this limit.

Hospital Inpatient Submodel

This submodel requires as input the total annual number of short-term hospital days utilized in each State in each year of the projection period. The submodel structure is based on an intensive analysis of historical national data which show that nurse requirements in this setting are adequately determined by projecting requirements as follows:

$$RN_{2s}(t) = RNN_s + RNIC \cdot IC_s(t) + RNPD_s(t) \cdot PD_s(t)$$

where

$RN_{2s}(t)$ = total number of FTE RNs employed in non-Federal short-term hospital inpatient units in year t and State s;

RNN_s = hospital inpatient FTE RNs employed in the Department of Nursing Service (excluding nursing faculty) in 1972 and State s. This is an empirically derived constant based on recent data which show that RN_N has remained relatively stable (at the national level) and, hence, that RN_N is not time dependent;[13]

$RNIC$ = average number of FTE RNs/ICU bed;[14]

$IC_s(t)$ = number of ICU beds in year t and State s;

$RNPD_s(t)$ = number of FTE RNs employed (plus vacancies) in the Department of Nursing Service [15] per patient day in year t and State s; and

$PD_s(t)$ = number of inpatient bed days in year t and State s (calculated in demand for service section).

The values of $IC_s(t)$ and $RNPD_s(t)$ are determined by calculating a national average growth rate and by assuming that this rate of growth is appropriate for each State. The trends in these quantities start from State-level 1972 data which is provided in Bureau of Health Resources Development [1972] and American Hospital Association [1973] reports.

This submodel also treats two types of role reformulation which could significantly affect baseline trends in the employment of nurses on hospital inpatient units: the constitution of the primary nursing (PN) concepts and the expansion in the role of hospital-based clinical nurse specialists.

On units employing primary nursing, one nurse assumes responsibility for all of the nursing needs of a small number of patients (typically three to six in an intermediate care unit) on each shift. These PN units use a mixture of RNs, LPNs, and aides with greater RN/aide and LPN/aide ratios. The effect of primary nursing is calculated from:

$$RN^*_{2s}(t) = RNN_s + RNIC \cdot IC_s(t) + f_1(t) \cdot [RNPD_s(t) \cdot PD_s(t)] + [1 - f_1(t)] \cdot RNPN_s(t),$$

---

[13] Source: *Nursing Personnel in Hospitals*, various editions.

[14] The value of this parameter is assumed to be slightly less than 1.0 (i.e., assuming one RN per five ICU beds and that an ICU must be staffed 24 hours a day and one FTE registered nurse works 4.5 shifts (8 hours) per week). This parameter is also assumed to be constant for all States.

[15] Adjusted to account for RNs in ICUs and determined from extrapolating least squares regression lines on historical data [BHRD, 1970, 1974a, and 1974b; and AHA, 1973, 1974, and 1975].

where

$RN^{*}_{2s}(t)$ = number of FTE RNs in short-term general hospital inpatient units after expanded use of the primary nursing system in year t and State s,
RNN_s = hospital inpatient FTE RNs not employed in the Department of Nursing Service (excluding nursing faculty) in 1972 and State s,
$RNIC$ = average number of FTE RNs/ICU beds,
$IC_s(t)$ = number of ICU beds in year t and State s,
$f_1(t)$ = fraction of hospital inpatient units not adopting primary nursing system in year t,
$RNPD_s(t)$ = number of FTE RNs employed (plus vacancies) in Department of Nursing Service per patient day in year t and State s,
$PD_s(t)$ = number of patient days in year t and State s, and
$RNPN_s(t)$ = number of FTE RNs in hospital inpatient units adopting primary nursing system in year t and State s.[16]

The second major role reformulation currently occurring in the inpatient units of short-term general hospitals is the development of expansion of roles for the clinical nurse specialist. Clinical nurse specialists (also called clinicians) are nurses who share "... major responsibility for assessing, planning, implementing, and validating programs of nursing care ... and participating in nursing research" [Browning and Lewis, 1973]. Nearly all new clinical nurse specialists are active RNs who obtain an MS degree. Thus, an increase in the supply of CNSs results in a concurrent decrease in the number of active RNs and hence an increase in the requirements for personnel to fill vacancies caused by the RN seeking further education. Since the roles of CNSs and RNs do not totally overlap, employment of new CNS graduates to replace RNs only occurs if the CNS performs traditional RN tasks. Therefore, the increase in RN requirements resulting from expansion of CNS roles equals the increase in the number of CNSs who assume new roles in the inpatient setting. This requirement is calculated as follows:

$$RN^{5}_{2s}(t) = RN_{2s}(t) + f_2 f_3 f_4(t) \cdot RNMS_s \cdot e^{.062t},$$

where

$RN^{5}_{2s}(t)$ = number of FTE RNs in hospital inpatient units with an expansion of clinical nurse roles in year t and State s;
$RN_{2s}(t)$ = number of FTE RNs requirements estimated in the hospital inpatient model in year t and State s;
$RNMS_s$ = nurse MS graduates in 1972 and State s;[17]

---

[16] This number is calculated by solving three simultaneous linear equations for each year t. The first of these equations is based on the assumption that a hospital budget is fixed and that the total inpatient budget for nursing staff is identical for PN and non-PN units. The second and third establish RN/aide and LPN/aide ratios, respectively, both of which represent the average ratios for PN units reported in the literature [Manthey, 1973]; [Manthey and Kramer, 1970]; [Logsdon, 1973]; [Felton, 1975]. The total number of RNs in primary nursing units is also dependent on $f_1(t)$.

[17] This value is inflated exponentially over time as shown in the equation. The growth rate (.062) is estimated from historical data provided in ANA [1974a].

f_2 = fraction of RNs with master's degrees entering clinical practice estimated to be 0.45 (from *Facts About Nursing*, 1972–1973);[18]
f_3 = fraction of MS nurses in clinical practice in hospitals, estimated to be 0.66 (from American Nurses' Association [1974a];[18]
$f_4(t)$ = fraction of hospital-based MS nurses assuming new roles in year t.

The number of nurse MS graduates is the driving force of this equation, since it is assumed that the number of CNSs will be supply-limited in the near future. Values for $f_4(t)$ are an input to the model.

Hospital Outpatient Submodel

This submodel computes the total number of nurses required in short-term general hospital outpatient and emergency clinics. It requires as input the total annual quantity of visits to such clinics. It is based upon the assumption that nursing intensity in this environment will continue to remain relatively stable, as it has in the past. The resultant functional form is:

$$RN_{3s}(t) = RNPV_s \cdot VO_s(t),$$

where
$RN_{3s}(t)$ = FTE RNs in hospital outpatient and emergency units in year t and State s;
$RNPV_s$ = average number of employed RNs per outpatient visit in State s;[19] and
$VO_s(t)$ = number of visits in year t and State s.

Nursing Home Submodel

This submodel estimates the number of nurses employed in nursing homes of all types, given an estimate of the number of resident days of care required each year. Its structure, which is relatively uncomplicated, is dictated by a relative paucity of reliable data in this setting. It may be summarized by:

$$RN_{4s}(t) = \sum_j NHPD_{js}(t) \cdot HD_{js},$$

where
$RN_{4s}(t)$ = number of FTE RNs employed in nursing homes in year t and State s;
$NHPD_{js}(t)$ = number of type j nursing home patient days in year t and State s; and
HD_{js} = nurses per day of care in type j nursing homes and State s.

At present, two types of homes are treated: nursing care homes and personal care with nursing homes as defined by NCHS. Personal care and domiciliary care homes employ only a small fraction of the nurses in nursing homes, so they are grouped in the second category. $NHPD_{js}(t)$ has not exhibited any marked trend at the national level in recent years, and should remain stable in the near future on the presumptions that no major legislation is passed regulating the staffing of nursing homes and that no other significant changes in the nursing home environment will occur. Values of $NHPD_{js}(t)$ were obtained from analyses of data in National Center for Health Statistics (NCHS) [various dates], American Nurses' Association [1974], and NCHS [undated–b].

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[18] Assumed to be identical for all States.

[19] The values of these parameters are based primarily on analyses of data from *Nursing Personnel in Hospitals, 1972* (tables 5 and 11), [BHRD, 1974a], and *Hospital Statistics, 1973 Edition*, (table 5), [AHA, 1974].

The HMO Clinic Submodel

This submodel projects the number of nurses required in HMO ambulatory clinics, given the total annual number of visits to such clinics. Nurses required in this setting are estimated independently of nurses in other non-HMO ambulatory care settings because the nursing intensity in this setting, e.g., the number of RNs per visit, is significantly different. However, the data are relatively sparse, and do not allow the determination of its variation over time. (Furthermore, the paucity of published data does not permit variations in the intensity of nursing services across different States.) Hence, it is assumed to remain stable and identical for all States in the absence of any empirical evidence to the contrary.[20]

Consequently, the submodel assumes that the number of nurses in this setting is proportional to the number of visits in HMO clinics as generated by the demand-for-services section. It may be summarized as:

$$RN_{3s}(t) = RNHV \cdot HV_s(t),$$

where:

$RN_{3s}(t) =$ number of FTE employed in HMO clinics in year t and State s;

$RNHV =$ average number of RNs per HMO visit;[21] and

$HV_s(t) =$ number of HMO visits by enrollees in year t and State s.

Community Health and Other Submodel

This submodel is actually a compendium of other submodels which are grouped together because they are, with little exception, determined independently from the detailed analyses of the population and demand-for-services model sections. In other words, they do not depend on inputs in the form of service demands (with the exception of home health nurses, which is discussed later). Nurse employment settings included in this category are:

1. community health, $RN_6(t)$;
2. all non-short-term general hospitals, $RN_7(t)$;

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[20] This assumption can clearly undermine any State-to-State variations in estimated HMO impact. However, since estimated HMO impact is relatively small (i.e., generally below the inherent range of model error), this assumption is probably of limited consequence.

[21] Value derived from Gorby and Associates [1974], which is assumed to be identical for all States and time invariant, and is estimated to be $9.92 \times 10^{[illegible]}$.

3. private duty and other nurses, $RN_8(t)$; and
4. nurse educators, $RN_9(t)$.

The community health submodel projects the requirements for several types of community health nurses. It can be summarized as:

$$RN_{6s}(t) = RNCV \cdot HCV_s(t) + (1 + \alpha_1 t)RNBE + (\alpha_2)^t RNOH + (1 + \alpha_3 t)RNCH,$$

where

$RN_{6s}(t)$ = number of FTE RNs employed in community health in year t and State s;
$RNCV$ = number of FTE RNs per home care visit;
$HCV_s(t)$ = number of home care visits in year t and State s;
$RNBE$ = number of FTE RNs employed by boards of education in 1972 and State s;[22]
$RNOH$ = number of FTE RNs employed in occupational health in 1972;[22]
$RNCH$ = number of FTE RNs employed in other community health activities;[22] and
α_j = empirically derived constants which reflect historical time series changes in RNs employed in setting j. These are assumed identical for all States.

It is assumed in this model that the number of home health nurses is proportional to the number of home care visits determined by the demand-for-services section. Note, however, that other types of community health nurses do not depend on the results of the demand-for-services section. This is because these categories will not be significantly influenced by changes in health insurance, and are thus assumed to grow in accordance with past trends. The constants (α_j) in the above model are derived from historical data at the national level, in particular, the ANA [1974a] and Bureau of Health Manpower [1975] documents.

Nurses in "other" hospitals include those working in all Federal and in non-Federal long-term care hospitals. Care in the majority of these settings is already provided largely by public agencies, and is assumed to be insignificantly affected by national health insurance. Data from previous years [BHRD, 1972, 1974a, and 1974b] [American Hospital Association 1974] indicate that at the national level nurse employment in the aggregate is adequately described by a uniform growth pattern. Consequently, a linear model was used of the form:

$$RN_{7s}(t) = (1 + \sigma t)\ RN_{7s}(O),$$

where

$RN_{7s}(t)$ = number of FTE RNs employed in "other" hospitals in year t and State s;[23]
$RN_{7s}(O)$ = number of FTE RNs employed in "other" hospitals in 1972 and State s; and

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[22] Source: *Survey of Public Health Nursing 1968–1972*, November 1975.

[23] 1972 data is from *Hospital Statistics*, 1973, table 5C.

σ = constant determined from linear regression on national data (assumed identical for all States).

"Private duty and other" nurses is a category including all those not previously discussed except nurse educators. Like all "miscellaneous" categories, requirements in this group are difficult to determine because of a lack of appropriate time series data. However, analysis of data reported in American Nurses' Association [1974] indicates that employment in this setting is declining roughly in accordance with the following models:

$$RN_{8s}(t) = (\gamma)^t RN_{8s}(O),$$

where

$RN_{8s}(t)$ = number of FTE RNs employed in private duty and other settings in year t, and State s;[24]
$RN_{8s}(O)$ = number of FTE RNs employed in private duty and other settings in 1972 and State s; and
γ = empirical constant determined from least squares linear regression on national data.

Private duty nurses, the demand for whom is known to be falling rapidly are the main component of this classification. From our analysis, we can assume that NHI will not substantially reverse this trend.

The final nursing category consists of nurse educators. The model assumes that factors affecting the supply of nurses and the vocational choice of nursing students do not change differentially between States so that the number of educators required bears a direct, constant relationship to the number of nurses employed in that State.[25]

Under this assumption the number of nurses is determined by

$$RN_{9s}(t) = \frac{f_s}{1-f_s} \sum_{j=1}^{8} RN_{js}(t),$$

where

$RN_{9s}(t)$ = number of FTE nurse educators in year t,
f_s = the ratio of 1972 nurse educators in State s to total number of employed RNs in that State,[26] and
$RN_{js}(t)$ = number of FTE RNs as determined in State s for setting j in the above submodels by State.

Aggregated Results

The model also provides estimates of the total FTE registered nurse requirements for each State and the total requirements by setting for the Nation. State totals are obtained by aggregating the results from the above submodel across the nine practice settings;

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[24] 1972 data is from *1972 Inventory of Registered Nurses*, table 24.

[25] Although this assumption is reasonable for the purposes of the model (i.e., nurse educators represent a small fraction of the total nurse work force and can be roughly approximated), it clearly does not accurately determine the number of educators required by State. Accurate determination of this number requires inclusion of the interaction between nursing supply and requirements as well as a description of migratory and educational choice behavior of graduates and students, respectively.

[26] Values of f_s by State were obtained from the 1972 Inventory of Registered Nurses, table 24 [ANA, 1974].

$$R_{Ts}(t) = \sum_{j=1}^{9} R_{js}(t),$$

where

$R_{Ts}(t)$ = total FTE RN requirements in year t and State s,
$R_{js}(t)$ = number of FTE RNs employed in practice setting j in year t and State s.

The national estimates are obtained in two ways. The first substitutes a set of national-level parameter values into the model and treats the Nation as though it were a State. The second aggregates the State-level estimates to provide a national total,

$$R_{jN}(t) = \sum_{s=1}^{51} R_{js}(t),$$

where

$R_{jN}(t)$ = number of FTE RNs required by setting j for the Nation in year t,
$R_{js}(t)$ = number of FTE RNs employed in practice setting j in year t and State s.

Appendix B

RESULTS USING THE VRI NURSE REQUIREMENTS MODEL

In order to calculate projected State nurse requirements from the analytic model described in appendix A, a FORTRAN language version of the model was programmed for use on the University of Michigan's Amdahl 470V/6 computer system. This program was run with various data bases to determine the requirements for nurses under each of the scenarios defined in the main text of this report. Also, many additional model runs were made to test the sensitivity of the model to various assumptions.

The model estimates, some of which were summarized in the body of the report, are presented in greater detail in this appendix. In order to limit the total volume of the report, the model estimates presented are restricted to the total RN requirements for selected years for each State.[1] Totals, rather than setting-specific estimates, are presented, since the level of confidence in these more aggregated results is much greater than that by the setting-by-setting estimates.[2]

In addition to presenting detailed results of model outputs for each scenario, this appendix provides information on the values of model inputs and model parameters for these scenarios. For ease of reference, the material in this appendix is organized in the same order as the main body of the report. That is, model results concerning the baseline, national health insurance, HMO enrollment, and role reformulation are presented in that order.

The Baseline

To analyze the impact of the three health system changes on nurse requirements, the model was first used to estimate future requirements for RNs in the absence of these changes. That is, a "baseline" case was created to represent a situation in which the health system continues on its present course, without the institution of a national health insurance program, with limited increases in HMO enrollment and sparse adaptation of concepts which create a reformulation of nursing roles. These estimates were based on an analysis of historical time series data which reflect variations in the size and composition of State populations, their respective demands for health care services and the State-to-State differences in the number of nursing personnel employed to satisfy these demands. National-level data sources were utilized almost exclusively in these projections to keep the estimates developed for one State comparable to those for other States. The following subsections describe the baseline conditions for each of the three major model components—population, demand for service, and nurse manpower requirements modules.

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[1] It should be noted that the model develops four types of estimates: tables of aggregate health service demands; tables of RN requirements by setting; tables of LPN requirements by setting; and detailed breakdowns of the role reformation contributions.

[2] Although the level of confidence in these setting-by-setting estimates is limited, some readers may be interested in them; therefore, they are presented for the baseline case in appendix C.

Baseline Population

The State baseline population projections are essentially an apportioning of the Bureau of Census Series II projections for the United States.[3] This series predicts that the U.S. population will increase by about 12.3 percent from 1972 to 1985. Using the methodology described under *Population Module* in appendix A to estimate future State populations, the rate of growth varies considerably from one State to the next. As can be seen in table B–1, the estimates from the population submodel predict a wide dispersion of the 1972 to 1985 percent change in individual State populations, with a maximum State growth of 45 percent occurring in Arizona and a minimum State growth of 3 percent in West Virginia. The District of Columbia, a city, is the only area estimated to have a reduction in population over the projection period.

The estimates of the population distribution in table B–1 compare reasonably well with similar, although somewhat outdated, Bureau of Census State-level projections (Series IE).[4] Notable differences between the Census and population submodel projections of this distribution occur in five States—California, Florida, Illinois, New Jersey, and New York. The greatest of these differences occurs in the California projections where the VRI submodel estimates the 1985 California population will be about 10 percent less (or approximately two million persons) than estimated in the Bureau of Census Series IE projections. Such differences are primarily reflected by differences in assumptions concerning the interstate migration of the population which, in turn, clearly influence the State-level requirements for the registered nurse component of these populations. Further, it is unreasonable to assume that any model run predicts these requirements to any greater accuracy than that achievable for State population's estimates; therefore the accuracy of the 1985 State-level RN requirement projections is probably at best ± 20 percent.

In the baseline scenario the State populations are assigned health insurance coverage in terms of average coinsurance rates. The purpose of this insurance coverage distinction is to permit subsequent analyses of the effect that changes in this coverage (i.e., through a national health insurance) might have on health service demands and hence RN requirements. Therefore the level of insurance coverage does not affect the baseline estimates of RN requirements but simply provides a health insurance characterization of the population in the absence of national health insurance.

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[3] As noted in appendix A, the Series II projections were adjusted to predict civilian resident populations by eliminating a presumed almost constant military nonresident population of approximately 2.4 million individuals.

[4] See *Preliminary Projections of the Population of States 1975 to 1990*, Current Population Reports series P-25, No. 477, March 1972.

A number of data sources which detail public (e.g., Medicare and Medicaid) and private insurance coverage by State or region [5] were analyzed to obtain an average coinsurance rate. This information was then coupled with an estimate of the average national level of benefit (i.e., coinsurance rate) provided under these plans to obtain State-level average co-insurance rates for hospital inpatient and ambulatory services. That is, State-average coinsurance rates differ only as a function of the fraction of persons insured in that State, since the level of insurance benefit for a given service is assumed to be the same across States. Table B–12 (see page 69) provides estimates of the fraction of persons in each State with some form of ambulatory and/or hospital inpatient insurance.

In addition to providing a health insurance characterization of the population, the baseline population includes a description of the enrollment in health maintenance organizations (HMOs). The baseline HMO enrollment scenario assumes that the abrupt drop in the rate of HMO formulation experienced in 1975 (see Weatherville and Nordby [1975]) is not transient but will continue into the future. Thus, no new HMOs are added through the projection period. Those HMOs in existence in 1974 will, however, continue to add new enrollees at a rate which is dependent on the known age distribution of these HMOs. The resultant growth in the baseline HMO population is from 3.2 percent in 1974 to 6.7 percent in 1985.

Baseline *Per Capita* Demands

Estimates of 1972 baseline *per capita* demands were made for the non-HMO population for six nursing practice settings for each State (hospital inpatient, hospital outpatient, physician office, nursing care home, personal care home, and home care). The annual number of bed days demanded per person in a region by age and sex were derived from data contained in NCHS [1973a]. Specific age/sex characterization of State data provided a differentiation of the *per capita* demands for each State within a region. These estimates were then reconciled [6] so that the 1972 total bed days demanded agreed with that documented by provider statistics in AHA[1973].

Per Capita demands for services in other settings were obtained in a similar manner, using data sources such as NCHS [1975] for hospital outpatient and physician office visits and NCHS [undated c] for nursing home days. In the latter case the estimates are derived assuming only persons in the 40-65 and 65+ age groups utilize nursing care homes or personal care homes with nursing—the two nursing home categories treated by the model. Further, it is assumed that the number of nursing home services demanded in each category continues to be divided across each age/sex group in the same proportions as experienced in 1972.

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[5] For example see DHEW [1974d], Health Insurance Institute, [1975], Mueller [1975], Worthington [1975], and NCHS [1975a].

[6] Although this reconciliation differed for each State, the average adjustment was approximately 10 percent.

Data to estimate *per capita* demands for home care visits are extremely limited: These demands were estimated from data found in BHM [1975], which provided an estimate of the total number of visits provided in 1972, and in Hurtado, *et al.* [1972], which gives an estimate of the demand for home care visits by age and sex of the population enrolled in Kaiser of Portland. Since State-level data concerning these estimates were not available, the model assumes that State differences in the home care visits demanded is only dependent on the differences in the age/sex composition across these States.

In the absence of cohort-specific service demands for HMO enrollees, the model estimates these demands by assuming they are proportional to the nonenrollee demands of the same cohort. The proportionality constants used, α_i, depend only on the service setting,[7] and were assumed to be independent of time.

The first constant, α_1, is the ratio of hospital inpatient utilization (measured in terms of patient days) of HMO enrollees to that of the total population and is defined as

$$\alpha_1 = \frac{BD}{\Sigma f_i BD_i},$$

where

BD = bed days *per capita* of the HMO,
f_i = fraction of HMO enrollees in age category i, and
BD_i = bed days *per capita* of the total population in age category i.

Then, by weighing the estimates of α_1 from each HMO by the enrollment of that HMO, we find that $\alpha_1 = 0.439$ (as indicated in table B–2).

The second constant, α_2, is the ratio of outpatient utilization of HMO enrollees to that of the total population,[8] and is defined as

$$\alpha_2 = \frac{V}{V_p} \cdot \frac{V_p}{V_p + V_o},$$

where

V = *per capita* outpatient visits by HMO enrollees,
V_p = *per capita* physician office visits of the total population,
V_o = hospital outpatient visits of the total population.

Using the data in table B–3 to obtain an estimate of V/V_p and the data found in Gorby and Associates [1974] which show that 5.5

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[7] This means that the α's are the same for each State. However, since *per capita* demands vary across States, service demands for HMO enrollees do also.

[8] Note the model assumes that HMO enrollees utilize outpatient services in the HMO clinic setting rather than the hospital outpatient and physician office settings.

percent of medical services are provided outside HMO facilities,[9] the value of this ratio becomes

$$\frac{V}{V_p} = .811 \times 1.055 = .856.$$

From NCHS (1973b) and American Hospital Association (1974), it can be derived that $V_p/V_p + V_p$ is about .84 so that $\alpha_2 = .722$.

HMO enrollees are assumed to utilize nursing home services at the same rate as the general population in each State, due to lack of any reported data in this area. This assumption appears to be reasonable since intermediate and long-term care is considered to be a supplemental health service [National Archives and Records Service, 1974]. Thus, most HMOs either provide this service on a fee-for-service basis or do not provide it at all.

As we have already described, the *per capita* utilization of home health services of the general, civilian population was itself estimated from data from the Kaiser of Portland HMO. Hence, *per capita* demands in this setting are identical between HMO and non-HMO enrollees.

Finally, to provide a mechanism for treating anticipated growth in health service utilization rates, the *per capita* demands for both the HMO and non-HMO populations are inflated at a rate shown in table B–4. The growth rates adopted in table B–4 are moderately conservative since they exclude data which appear to reflect large-step increases in insurance coverage as was experienced with the passage of Medicare and Medicaid.[10]

The estimated increase in the 1972–1985 total service demands by State are provided in table B–5. The increase shown in this table provides some insight into the potential settings which contribute to increased demands for nurses. However, it should be noted that the most significant of these are increases in the hospital inpatient settings and that the increase in other settings may have limited impact on nursing. This is particularly true in the case of increases in the HMO visits, since a very large percentage increase may simply exist because of the relatively small 1972 HMO enrollment. For example, the .820 percent increase in New Mexico's HMO visits rate reflects a change from 15,000 to 138,000 annual visits or an approximate increase of about 10 FTE RNs employed in this setting. Conversely the State of Washington is estimated to have a very large percent increase in the demand for HMO visits relative to a large 1972 HMO visit rate which significantly influences RN employment.

Baseline RN Requirements Estimates

Baseline estimates of the requirements for RNs in each of the practice settings described previously are aggregated to provide

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[9] This data correction assumes that all out-of-area services are outpatient services.

[10] It is assumed that significant improvement in the insurance coverage of the population (e.g., Medicare, Medicaid, plus an increase in private insurance coverage) would influence *per capita* demands for health care. Unfortunately, there is insufficient data to relate these factors in any way other than to eliminate those years which demonstrate a significant increase in demand which appears to be the result of large-scale increases in insurance coverage.

State-level RN requirement projections. Where possible, State-level nurse employment data were used to estimate parameters to translate setting-specific service demands into nurse manpower requirements. These requirements were estimated in terms of full-time-equivalent (FTE) positions [11] since this measure appeared to be the most useful for analysis purposes.

The following paragraphs summarize parameter values and the methodology for applying each of the setting-specific submodels described previously to estimate RN requirements in that setting. The order in which these settings are discussed parallels that provided in the model structure in the previous chapter.

Physician Office.—The translation of the projected demand for physician office visits into nurse manpower requirements uses data on the 1972 distribution of physicians by specialty (see AMA [1972]), the projected future supply of these physicians (using data from AMA [various dates]), and estimates of the number of employees per physician as a function of the visits per week provided by physicians in each specialty class. Table B–6 contains the number of physicians in private practice by specialty in 1972. These numbers are inflated at a rate experienced by the Nation over the 1963 to 1973 period, which results in an overall average of a 1.5-percent increase per year. The model assumes that the ratio of hospital visits to office visits is set equal to that experienced in 1972 and is the same for all States (see table B–7). Further, it is assumed that the ratio of FTE RNs to other employees in physician offices is also fixed at a level to produce the number of FTE RNs in office practice found by *The 1972 Inventory of Registered Nurses.*[12]

The number of physician office visits satisfied by nonphysician (extender) personnel in the baseline case is a function of the difference in the number of visits which could be economically satisfied [13] by conventional practice arrangement and the total number of visits demanded. The fraction of these extender personnel who are RNs determines the additional nurses required to provide the excess visits necessary to fill this difference. In the baseline case, the total visits demanded is determined in the demand-for-services section, and the number of visits supplied is dependent on the number of physicians in each State and the estimated maximum number of visits they can provide. The number of RNs practicing in extended roles in the baseline case is set equal to about 5 percent of the Nation's RNs in this practice setting by assuming that 20 percent of the staff in extended roles are RNs. This results in nearly a fixed number of State-level FTE RNs in office practice who are in such roles over the entire projection period.

Hospital Inpatient.—The translation of projected demands for hospital inpatient days into FTE RN requirements relies heavily on data contained in BHRD [1974b] to provide State-level 1972 parameter values. Specific parameter values derived from this data include the number of FTE hospital-based RNs not employed in the Department of Nursing Service and the number of FTE RNs per patient day. Time trends in the latter parameter were developed for both the Nation and States using 1968, 1970, and 1972 nurse employment data [BHRD, 1970, 1974a, 1976b]. Analysis of these trends revealed that State-level trends were probably inappropriate since the data base is taken from only 3 years and since the State-level data uses a smaller sample size and is more subject to major variations not found in national data. Therefore all time trends to reflect changes in the intensity of hospital nursing services are based on national rather than State-level trends.

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[11] For all settings full-time-equivalent parameters were computed by adding the number of full-time employees to 0.5 times the number of part-time employees.

[12] Estimates of 1972 FTE RNs in office practice were provided by the Division of Nursing using their 1972 ANA RN Inventory data base.

[13] The analyses in Reinhardt [1970] indicate that physicians can profitably utilize no more than four employees, thus using Reinhardt's production function, the maximum number of visits economically satisfied is that which he can provide with four employees in conventional rather than extended roles.

Applying a simple regression model to historical data for different time periods (e.g., 1955–1967 versus 1968–1974) resulted in significantly different estimates of the projected number of RNs per bed day. Using available data since 1968 to estimate this trend, the projected number of nurses in hospitals increases by 50 percent in 10 years (1985) without any change in the number of hospital inpatient days. Although such an occurrence is plausible, it does not appear probable. That is, recent increases in the number of RNs per bed day reflect changes in this setting such as increases in technology and occupancy rate or a reduction in RN vacancies which may not continue in the future.

Consequently alternative trends were examined to incorporate the changes in the vacancy rate (using ANA inventory data and data found in Yett [1968]), the changes in admissions, length of stay and/or occupancy rates (using the analysis described in Levine and Phillip [1973]) and a more extensive data base (by introducing data from earlier and more recent years available from such sources as AMA, [1973]). The result of this examination was the development of a trend in RNs per bed day which consisted of an exponential time trend in vacancies and a linear trend in the intensity of nursing services (RNs per patient day) as is shown below [14]:

$$\mathrm{RNPD}(t) = \left[\frac{\mathrm{RNPD}(1972)}{1 - 0.0387e^{-0.26t}} + 0.232t\right]10^{-3}.$$

Table B–8 provides estimated values for this parameter (RNPD).

The projected trend in the number of ICU beds [15] [AHA, 1974] is approximately a twofold increase in the number of RNs required in these units over the projection period. In the baseline case no reformulation of nursing roles occurs in hospital inpatient units; therefore, no additional RN requirement as a consequence of this phenomenon is included in this scenario.

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[14] This trend depends on the number of RNs per bed day employed in each State in 1972. For the Nation this trend results in a 22-percent increase from 1972–1985 in the requirement for RNs employed in the Department of Nursing Services who are not in ICUs.

[15] National trends are used to predict the number of ICU beds by State for reasons similar to those noted above.

Hospital Outpatient.—The translation of projected hospital outpatient demands into RN requirements relies heavily on the historical evidence which suggests that the number of nurses employed in short-term hospital outpatient departments [16] is independent of time (see table B-9) and varies directly with the number of outpatient visits demanded. Thus, the projected requirements for RNs in hospital outpatient departments are directly proportioned to the projected demand for outpatient visits in each year. The RN/visit parameter values used to translate outpatient visits into RN requirements is given in the third column of table B-8 (RNPV).

Nursing Homes.—The method of translating the demands for nursing home services into RN requirements is similar to that employed in estimating the requirements for RNs' outpatient departments. That is, the number of RNs per nursing home day for both types of nursing homes [17] has not exhibited a marked trend in recent years and so is assumed to remain stable at the values shown in the last two columns in table B-8.[18] This assumption has the effect of postulating that any legislation concerning nursing homes will not significantly influence the future staffing of nursing homes.

Health Maintenance Organizations.—The only State-specific factor influencing the number of RNs required in HMOs is the projected number of visits to HMOs in each State (see table B-5 for percent change in visits by State over the projection period). These visits are then multiplied by an estimate of the average FTE RNs per visit experienced by the Nation (9.92×10^{-5}).

Community Health, Education, and Other Settings.—Projection of RN requirements in the remaining model settings primarily depends on the number of nurses employed in these settings in 1972 and a growth factor which adjusts these numbers to reflect future requirements. Table B-10 displays the 1972 RN employment levels [19] for each State for: nurses employed by boards of education (RNBE); nurses employed in occupational health (RHOH); nurses employed in other community health activities (RNCH); nurses employed in other hospitals such as non-AHA hospitals or non-short-term general hospitals (RNT); private duty nurses and miscellaneously employed nurses (RN8); and nurse educators (RN9). The FTE numbers in this table are rounded to the nearest whole figure. The growth parameters for each category are either simple or compound growth factors as indicated in appendix A.

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[16] Outpatient departments include emergency units, clinics, and other services provided in hospitals on an outpatient basis such as physical therapy, counseling, and renal dialysis.

[17] Two types of nursing homes explicitly treated in the model are nursing care homes and personal care with nursing (as defined in the NCHS Master Facility Inventory). RNs employed in the other categories of nursing homes (personal care homes and domiciliary care homes) are grouped with the second of the above categories since they employ less than 2 percent of RNs in nursing homes (see NCHS [undated b]).

[18] Parameter values are shown in table B-8 for nursing care homes (RNHD1) and personal care with nursing homes (RNHD2). Several of the latter parameter values are smaller than 0.0005; these cases are indicated by an asterisk.

[19] The data sources for these 1972 employment figures are: Bureau of Health Manpower [1975] for school nurses and nurses employed in other community health activities; American Nurses' Association [1974b] for industrial nurses, nurse educators and private duty and miscellaneously employed nurses; Bureau of Health Resources Development [1972, 1974c, 1974b] for nurses employed in AHA non-short-term general hospitals; and Bureau of Health Resource Development [1974c] for nurses in non-AHA hospitals.

Baseline RN Requirements Projections

Table B–11 provides a summary of the State-level RN requirement projections under the baseline scenario. The more detailed, setting-specific projections for this scenario are provided in appendix C. The baseline scenario is very similar to the "norm" scenario used in estimating the Nation's requirements in VRI [1976]. That is, the scenario assumes that a national health insurance program will not be implemented before 1985 and that no new HMOs will be developed (although existing HMOs will be allowed to grow at historical rates). Further it assumes that 20 percent of RNs in physicians' offices were practicing in extended roles in 1972 and that this percentage will not change with time.[20]

Comparing the sum of the baseline State-level estimates with the national estimates under the "norm" scenario, the State totals are higher in all cases.[21] Most of this difference is attributable to the addition of non-AHA hospital nurses in the State estimates. RN employment in this setting is relatively small in the national totals and therefore was not included in the national projections. Since RN employment in non-AHA hospitals represents a significant fraction of the hospital nurses in certain States (e.g., about 10 percent in Michigan), RNs employed in this setting were included in the State-level projections.

National Health Insurance

To demonstrate the effect of NHI alone on requirements for nurses, two scenarios were defined. In each of these, HMO enrollment and role reformulation parameters were held constant while health insurance parameters were varied. HMO parameters were selected such that no significant change in HMO populations occurred, and role reformulation parameters were selected such that no growth in acceptance of role reformulation concepts occurred. Settings of these parameters correspond to those of the baseline as discussed in the previous section. Only the setting of NHI parameters differ from the baseline scenario.

There are five parameters which determine the national health insurance impact. These are: NHI implementation year; NHI implementation period; and average coinsurance rate in the population, both currently and after NHI. The implementation year is any year from 1972 through 1985 in which a plan is deemed to take effect. The implementation is assumed to occur on January 1 of the implementation year. The implementation period is an integral number of years over which a plan is assumed to be uniformly phased into existence. The average coinsurance rate after NHI is assumed to be the average fraction of total health care costs (in a particular setting) paid out-of-pocket by the consumer after implementation of the plan. It is presumed to apply universally, i.e., across all States. The current average coinsurance rate is estimated on a State-specific basis.

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[20] The national projections under the "norm" case also assumed that 3 percent of the hospitals used primary nursing in 1972. The distribution of primary nursing across States is not known and since the effect of this assumption in State-level projections is minimal (about 20 FTE RNs in each State is distributed uniformly), the State-level projections assume none of the hospitals in 1972 have primary nursing.

[21] For example, the 1985 estimate for the Nation's RN requirements in table B–3 of the national model report is 1,003,100, whereas the total of the State-level estimates is 1,018,180. This is less than a 2-percent difference.

In the subsection which follows, the values of these parameters which are common to both NHI scenarios are discussed. These are the implementation year and period, the current average coinsurance rates, and the average demand-curve slopes. The rates in effect after passage of NHI are discussed in the respective scenario definitions in the succeeding subsections.

Health Insurance Parameters Common to Scenarios

For the two NHI scenarios postulated, the implementation year and period were fixed at 1979 and 2 years, respectively. Even though not all proposed NHI programs have a schedule for phasing-in benefits, there will still be a transient period, caused by delays in consumer awareness and other factors, over which demands for services will probably increase. Thus, as a conservative measure from the standpoint of impact on nurse requirements, analysis in the NHI scenarios assumes an implementation period of 2 years. Further, it was felt unlikely that any NHI program would be implemented before 1979.

Both current average coinsurance rates and the average coinsurance rates in existence after such a plan were determined makes the assumption that only non-HMO hospital and ambulatory services would be significantly influenced. This is based on the concept that nursing home, HMO clinic, and home health services will not be sufficiently affected by the type of NHI being considered to significantly affect the Nation's requirement for nurses. Second, the scenario assumes that the primary users of these services, the population 65 years of age and older, are already fully insured, i.e., the elderly are covered by Medicare, which insures everyone eligible for social security or railroad retirement benefits. The number of these individuals not covered in this way is on the order of a few hundred thousand [Davis, 1975]. Moreover, many of those not eligible for federally provided Medicare benefits may have purchased them, which they are entitled to do, and some of them may be eligible for Medicaid. (Four million of the elderly received Medicaid benefits in fiscal 1973 [U.S. Government, 1974]).

The NHI-specific average coinsurance rates are discussed in the appropriate succeeding subsections. However, the current average coinsurance rate estimated for each State was common to all scenarios. They were estimated as a function of the fraction of State population insured and the national average coinsurance rate of the insured population as described in appendix A, i.e.,

$$\bar{c}_s = P_s c + (1.0 - P_s),$$

where

$\bar{c}_s$ = average coinsurance rate for the entire State population,

c = the national average coinsurance rate for insured population for the Nation, and
P_s = fraction of the State's population that are insured.

The values of P_s, for hospital inpatient and ambulatory care, were estimated by analyzing a number of data sources which detail public (e.g., Medicare and Medicaid) and private insurance coverage by State or region.[22] This information was then coupled with an estimate of the average national level of benefit (i.e., coinsurance rate) provided under these plans to obtain State-level average coinsurance rates for hospital inpatient and ambulatory services. That is, State average coinsurance rates differ only as a function of the fraction of persons insured in that State since the level of insurance benefit for a given service is assumed to be the same across States. Table B-12 provides estimates of the fraction of persons in each State with some form of ambulatory and/or hospital inpatient insurance.

The value for c was assumed to be constant across States and was estimated using the following equation.

$$c = \frac{{}^{\bar{c}}\mathrm{us}^{-1\cdot 0} + {}^{P}\mathrm{us}}{P_{us}},$$

where

$\bar{c}_{us}$ = the average coinsurance rate for the entire national population, and
P_{us} = the fraction of the Nation insured.

The value for $\bar{c}_{us}$ derived in the previous study [VRI, 1976] was about 60 percent for ambulatory care and 10 percent for hospital inpatient care.[23] Combining this with the U.S. estimate of P_{us} provided in table B-12 results in an estimated value for c of 39 percent and 5 percent for ambulatory and hospital inpatient care, respectively.

The translation of these coinsurance rates into impacts on *per capita* demands is accomplished with the use of demand curve slopes. As described in appendix A, this impact measure, I_s is determined from

$$I_s = m\,(\bar{c}_l - \bar{c}_s),$$

where

I_s = change in *per capita* demand resulting from a change in price (insurance coverage),
m = the slope of a linear price-quantity demand curve,
$\bar{c}_l$ = price of care after NHI, and
$\bar{c}_s$ = price of care prior to NHI.

The values of c were determined as just discussed, while the values of c_l are dependent on the NHI scenario. The quantity M is the slope of a linear curve of price versus quantity demanded, and is expressed in terms of the number of additional (fewer) units of service demand *per capita* for a 100-percent decrease in price. To estimate the values of M, we applied the results of several, small-scale, social experiments which determined the elasticity of demand for health services as a function of price. Estimates of the demand for hospital inpatient services, as a function of price rely on research by Heaney and Reidal [1970]. Estimates for ambulatory services (hospital outpatient and physician office settings), are based on data from Scitovsky and Snyder [1972] who measured the response to changes in physician service prices of a group of insurance subscribers in Palo Alto, California. Using data from this research and making the linearity assumption, it can be shown that the overall slope appropriate for inpatient care is about −.517, and −5.472 for the ambulatory settings.

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[22] For example see HII [1975], Mueller [1974], Worthington [1975], and NCHS [undated a].

[23] See Worthington [1975] and Newhouse, Phelps, and Schwartz [1974].

NHI Scenario 1

The first national health insurance scenario (NHI 1) is designed to model the situation in which the portion of the population having neither private nor public insurance of any kind becomes insured. It is assumed for this scenario that as uncovered individuals become covered, they consume health services at the same rate as those in their respective cohorts who previously had health insurance. This is intended to reflect those NHI bills which do not necessarily provide benefits much greater than those already possessed by insured persons, but which guarantee some protection to everyone and thus plug the gaps in current public and private insurance coverage. This scenario assumes that if the benefits provided by NHI are not as extensive as those afforded to the currently insured, then they will supplement their NHI coverage through the purchase of additional private insurance. Furthermore, it is assumed that any cost advantages incurred as a consequence of NHI will not influence the currently insured to improve the total level of benefit of their insurance package.

Based on this concept of NHI, it is apparent that the average coinsurance rate for all persons in the United States will be equivalent to the current average coinsurance rate of the insured population. This, the reader will recall, was calculated in the previous subsection. The results of improving the average inpatient coinsurance rate from 10 percent to 5.3 percent and the average coinsurance rate for ambulatory service from 60 percent to about 39 percent is shown in table B-13 for all States. The difference in the national total impact of 154 percent and that predicted in the previous analysis of 152 percent is attributable to the minor difference in the two models used in these respective analyses.

NHI Scenario 2

The second NHI scenario, referenced hereafter as NHI 2, is designed to represent the extreme situation with NHI in which an essentially free and universal plan is adopted. This scenario reflects the result of NHI plans such as that supported by organized labor (i.e., the Kennedy-Corman Bill as submitted to the 94th Congress). As previously mentioned, it is assumed in this scenario that the plan will be implemented in 1979 and will require 2 years for its impact to reach full effect. Also, as discussed earlier and in chapter 3 of the national-level report, this analysis assumes the main effect to occur in the hospital inpatient and ambulatory care settings. By definition, then, the national average coinsurance rates for the totally free plan should be zero.

The results of using a zero coinsurance rate NHI plan are shown in table B-14. The sum of the State-level NHI impact in 1985 (shown as U.S.) is 162 percent which is slightly lower than the national-level estimate of 169 percent in the previous analysis. This difference is again attributable to minor differences between State-level parameter values and the national-level values.

HMO Scenarios

HMO data [Wetherville and Nordby, 1975] show that the net increase in the number of operational HMOs increased rapidly through 1974, but stopped abruptly in 1975. Several possible explanations of this phenomenon were provided in chapter 4 of VRI [1976]. These explanations lead to the formulation of high and average scenarios of HMO growth.

The high-growth scenario, assumes that changes to the 1973 HMO Act resulting in a high rate of HMO growth will be made. Here we assume that the rate of increase in the number of HMOs is primarily constrained by the number of HMOs currently in the formational stage of development. In this scenario the total number of new HMOs for all States is estimated to be 65 per year by keeping the number of formational HMOs constant at the 1975 average.[24] The resultant increase in the Nation's HMO enrollment (from 2.4 percent in 1972 to 10.6 percent in 1985) is then distributed across States in relation to the HMO population of each State and the number of newly implemented HMOs for each State. (See, for example, number of formational HMOs by State estimated in Wetherville and Nordby [1975].)

The average growth scenario assumes that the rate of increase in the number of HMOs per quarter will be identical to the average rate experienced between January 1974 and July 1975. In this scenario, an average of 34 new HMOs are formed nationwide each year and 8.7 percent of the Nation's population are enrolled in HMOs by 1985.

In each of these scenarios, no impact from the other major health system changes is assumed to occur. That is, there will be no national health insurance and no growth in acceptance of role reformulation concepts. The estimates of RN requirements by State for the high- and average-growth scenarios are presented in tables B–15 and B–16, respectively. The total change in requirements for these two scenarios is identical to that estimated in the previous analysis of national-level requirements.

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[24] Average number of formational HMOs is estimated to be 65, based on data on the first three quarters of 1975 (see Wetherville and Nordby [1975] and other editions of the *Interstudy Census of HMOs*).

Role Reformulation

To demonstrate the effects of role reformulation on requirements for nurses, several scenarios were defined. In each of these, health insurance and HMO growth parameters were maintained at constant levels to permit isolation of role reformulation effects. The following subsections describe the manner in which the parameters governing these processes were obtained.

Primary Nursing

There appears to be a growing trend toward the "primary nursing" system, where on each shift one nurse assumes responsibility for all of the nursing needs of a small number of patients (typically three to six in an intermediate care unit). A primary nurse gives total care to his or her patients while on duty and plans these patients' 24-hour care throughout their hospital stay.[25]

Primary nursing was conceived and implemented by Marie Manthey at the University of Minnesota Hospital in 1970. Since then, a number of hospitals, including Sparrow Hospital, Lansing, Michigan;[26] VA Hospital, El Paso, Texas;[27] Childrens' Hospital National Medical Center, District of Columbia;[28] and Merritt Hospital, Oakland, California,[29] have instituted various versions of this system.

For our purposes the most significant impact of PN is that, in hospitals adopting primary nursing, a number of nursing assistants, aides, and orderlies are replaced with licensed nurses—either RNs or LPNs. In these units, data found in Manthey [1973], Manthey and Kramer [1970] Logsdon [1973], and Felton [1975] indicate that, on the average, approximate RN/aide and LPN/aide ratios of 2.04 and 1.19 are expected, respectively. These are slightly more than double the ratios expected in typical inpatient units currently.[30]

Using these ratios, the number of RNs and LPNs after the introduction of primary nursing is calculated from:

$$RN^* = (1 - f)RN + 2.04[A^* - (1 - f)A], \text{ and}$$
$$LPN^* = (1 - f)LPN + 1.19[A^* - (1 - f)A],$$

where:

RN^* = total number of RNs after adoption of primary nursing;

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[25] A complete discussion of primary nursing is given in G. D. Marram, M. W. Schlegel, and E. O. Davis, *Primary Nursing, A Model for Individualized Care*, St. Louis, C. V. Mosby Company, 1974.

[26] Personal communication with Ms. Christy Hawkins, Sparrow Hospital, Lansing, Michigan.

[27] Personal communication with Ms. Reidun Daeffler, VA Hospital, Phoenix, Arizona.

[28] G. Felton, "Increasing the Quality of Nursing Care by Introducing the Concept of Primary Nursing: A Model Project," *Nursing Research*, 24, 27–32, Jan.–Feb. 1972.

[29] G. D. Marram, M. W. Schlegel, and E. O. Davis, *Primary Nursing*, St. Louis, Mosley, 1974.

[30] Changes in staffing patterns are not, however, always necessary with the introduction of the concept (see Manthey [1973] and Manthey and Kramer [1970]).

RN = total number of RNs before adoption of primary nursing;
LPN* = total number of LPNs after adoption of primary nursing;
LPN = total number of LPNs before adoption of primary nursing;
f = fraction of units adopting primary nursing;
A* = total number of aides after adoption of primary nursing; and
A = total number of aides before adoption of primary nursing.

To perform this calculation we need to know the number of aides after adoption of primary nursing (A*), which is calculated by assuming that all hospitals operate on a fixed nursing budget and that adoption of PN must not exceed this budget. That is, given the relative wages [31] of RNs, LPNs, and aides, the following identity must hold to maintain a fixed budget:

$$1.73\ RN^* + 1.25\ LPN^* + A^* = 1.73\ RN + 1.25\ LPN + A,$$

where the parameters are identical to those defined above. The impact of primary nursing is thus calculated using the three equations above by choosing a value for f, the fraction of units adopting PN, and knowing the estimated number of RNs, LPNs, and aides not in primary nursing.

One method of estimating the rate of growth of PN is to assume that PN will be introduced at approximately the same rate as team nursing. Although the period that the hospital system required to nearly universally adopt team nursing cannot be exactly determined, a reasonable time frame appears to be initiation in the early 1950s and extensive acceptance by the late 1960s. Therefore we can hypothesize that structural changes in the delivery of hospital nursing services take about 15 years from inception to wide-scale acceptance, based on this historical precedent.

Based on consultation with persons familiar [32] with the status of primary nursing, we have estimated that less than 5 percent of inpatient units employ primary nursing in 1975. Thus, historical precedent indicates that universal acceptance of the concept could not occur prior to 1990. Furthermore, it is unlikely that universal acceptance, in the sense of adoption by 100 percent of inpatient units, would be realized, since the concept would necessarily be feasible for all types of hospital environments. Consequently, the maximum fraction of inpatient units employing the concept by 1985 is judged to be about 80 percent, while a "reasonable" or moderate value was judged to be about 40 percent. The two role reformulation scenarios (high and moderate) discussed later use these values as input.

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[31] The average hourly wages for RNs, LPNs, and aides in November 1974 was $4.84, $3.49 and $2.79, respectively. Hence, by assumption, an RN is

$1.73\ (\frac{4.84}{2.74} = 1.73)$ times as productive as an aide and an LPN is

$1.25\ (\frac{3.49}{2.79} = 1.25)$ times as productive as an aide.

[32] Personal communications, R. J. Daeffler, C. Hawkins, and B. Horn.

New Roles for Clinical Nurse Specialists

Clinical nurse specialists are nurses with MS degrees having research or advanced clinical practice as a purpose rather than teaching or administration.[33] Essentially, they may be viewed as RNs with an additional degree. The use of clinical nurse specialists in hospitals is not new, however, when CNSs are employed in new or "reformulated" roles, the ranks of RNs are correspondingly depleted assuming that the new roles do not overlap with the existing duties of RNs.

The extent of this impact is determined by the number of CNSs employed in hospitals in advanced clinical practice, and the fraction of those who enter reformulated roles. On the basis of historical trends and neglecting migration, the future number of MS graduates in each State is readily projected. These data also show that about 45 percent of the Nation's 1972 graduates of master's programs went into advanced clinical practice as their functional purpose. Further, about two-thirds of these graduates were employed in short-term general hospital inpatient units. Unfortunately, there are no data regarding the function of these newly employed MS graduates who enter "new" roles and thus of the number of new RN requirements. Because the total annual numbers of newly employed MS graduates in hospitals in advanced clinical practice are relatively small,[34] the estimated impact of variations in this fraction on RN requirements will be relatively minor. Consequently, to encompass the range of potential impacts, the analysis assumes a wide range of the acceptance of this type of role reformulation by varying this fraction from zero to unity. That is, a low growth rate scenario assumes the fraction of 1985 MS graduates who enter new roles is zero while moderate and high scenarios assume it to be 0.75 and 1.0, respectively.[35]

Nurses in Practitioner Roles in Physician Offices

As the demand for ambulatory services increases, the need can be met in three ways: by increasing the supply of physicians, by increasing the productivity of the office practice, and by utilizing nonphysician personnel to satisfy a part (or all) of the "excess" visits demanded. Because good data are available [AMA, various dates] and because of the length of the physician training programs, the supply of physicians can be quite reliably determined into the near future. Also, from Reinhardt [1970], we obtained data on the productivity of physician office practices, by specialty. An analysis of this information together with physicians' fees yielded the result that a physician can economically employ no more than about four aides of all kinds (receptionists, nurses, aides, etc.). Then, using the distribution of physician office practice sizes, and assuming limits on the maximum number of hours physicians are willing to work, we developed parameters for the physician office submodel which allowed the calculation of the quantity of office visits which could be satisfied by conventional practice arrangements.

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[33] See *1972 Inventory of Registered Nurses* [ANA, 1974b] and *Facts about Nursing* [ANA, 1974a].

[34] Less than 1,000 for the Nation in the base year, compared to almost 700,000 full-time equivalent RNs employed.

[35] This fraction is assumed to be zero in 1972 for all scenarios and to progress linearly to the 1985 value.

Based on our assumptions, the remainder of the required quantity of office services must then be satisfied by nonphysician personnel or remain unsatisfied. The nonphysician personnel consist of nurses, physician assistants, and other midlevel health workers functioning in extended roles. The fraction of these services provided by formal nurse practitioners or nurses informally functioning in practitioner roles is a highly speculative matter. There are only extremely sparse data on the number of nurses currently employed in such roles and no data on which to establish a trend for the future. The value of this parameter is dependent, among other things, on the future supply of nurses and physicians' assistants trained for these roles, and on the degree of licensing restrictions and regulations imposed by the States on such practice. On the basis of personal communications and such published data as are available, we have estimated the current fraction of such visits provided by nurses in practitioner roles is about 20 percent. To demonstrate the range of potential impact of growth in this parameter, we have computed results for its growth from 20 percent in the base year to moderate and high values of 65 percent and 100 percent in 1985, respectively.

Utilizing the quantity of services provided by nurses in practitioner roles calculated as discussed above, the actual number of nurses required to provide these services was determined. This was done utilizing the results of various studies which measured the productivity of such personnel in physicians' offices, relative to that of the physician. The results of these studies [36] indicated a range of 38 percent to 80 percent, with an average productivity of about 54 percent of that of the physician. The analysis uses this average.

Role Reformulation Scenarios

The previous discussion describes three parameters which determine the growth of role reformulation concepts. Each of these parameters is a fraction which specifies a measure of the acceptance of a particular role reformulation concept by the end of the projection period, 1985. To test the impact of role reformulation on nurse requirements over the range of these parameters, two scenarios were defined representing a moderate to high increase in acceptance.

The values of the three parameters are summarized in table B-17 for both of these scenarios. Also provided is the 1972 value for these parameters which is fixed for all scenarios and remains unchanged for all years in the baseline scenario.

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[36] See Zeckhauser and Eliastam [1974], Pondy [1972], Smith, Miller, and Golladay [1972], Schiff, Fraser, and Walters [1969], and Drui and Chamberlain [1975].

Tables B–18 and B–19 provide estimates of the full-time-equivalent RN requirements by State under these two scenarios. Comparing the total of all States to the estimates made in the previous study, the impact using the State model (149 percent and 153 percent) is less than that estimated using the national model (153 percent and 171 percent). Two factors contributing to this difference are:

1. Role reformulation on a State-by-State basis using a uniform model results in a limited change requirement for several populous States (e.g., Massachusetts); and
2. The State estimates presumed no primary nursing units would use only RNs, whereas the analysis of national-level requirements presumed that 15 percent to 35 percent of these units would be staffed with RNs only.

Combination of Health System Changes

It is reasonable to expect the combined effect of the health system changes examined earlier to be different from the sum of the effects of individual changes. Therefore, two combination scenarios were generated to reflect this situation. The first scenario has the combined effect of the NHI scenario (NHI 1), the moderate HMO growth scenario, and the moderate role reformulation acceptance scenario. Table B–20 presents the results of this combined scenario. The estimated impact for all States (158 percent) agrees very well with the national model estimate (160 percent), referred to in the previous report as the moderate combination scenario.

The second scenario combines the effect of the second NHI scenario (NHI 2), the high HMO growth scenario, and the high role reformulation scenario. Table B–21 presents the estimated RN requirements under this scenario. The total impact for all States under this combined scenario (177 percent) is substantially lower than that estimated for the Nation under similar circumstances (209 percent). This difference is primarily attributable to the difference between the national and State role reformulation assumptions (noted in the previous section) and partially attributable to the differences in the State and national model formulation and parameter values.

Table B–1.—Population submodel estimates of future State populations in thousands

	1972	1980	1985	Percent increase 1972–1985
Alabama	3,498	3,652	3,803	8.7
Alaska	298	353	390	30.9
Arizona	1,863	2,370	2,701	45.0
Arkansas	1,973	2,133	2,261	14.6
California	20,228	22,275	23,721	17.3
Colorado	2,276	2,673	2,941	29.2
Connecticut	3,069	3,253	3,398	10.7
Delaware	557	607	643	15.4
District of Columbia	750	704	694	−7.5
Florida	7,114	8,870	10,022	40.9
Georgia	4,676	5,137	5,479	17.2
Hawaii	769	872	942	22.5
Idaho	739	833	903	22.2
Illinois	11,204	11,512	11,848	5.7
Indiana	5,276	5,542	5,772	9.4
Iowa	2,860	2,903	2,974	4.0
Kansas	2,258	2,304	2,366	4.8
Kentucky	3,266	3,438	3,594	10.0
Louisiana	3,691	3,894	4,068	10.2
Maine	1,011	1,066	1,116	10.4
Maryland	3,975	4,367	4,645	16.9
Massachusetts	5,763	6,019	6,251	8.5
Michigan	9,015	9,500	9,906	9.9
Minnesota	3,871	4,082	4,261	10.1
Mississippi	2,256	2,357	2,457	8.9
Missouri	4,734	4,929	5,114	8.0
Montana	709	752	790	11.4
Nebraska	1,508	1,582	1,650	9.4
Nevada	509	644	728	43.0
New Hampshire	761	862	933	22.6
New Jersey	7,259	7,713	8,074	11.2
New Mexico	1,045	1,167	1,258	20.4
New York	18,338	18,617	19,032	3.8
North Carolina	5,150	5,532	5,841	13.4
North Dakota	623	634	652	4.7
Ohio	10,768	11,103	11,450	6.3
Oklahoma	2,607	2,810	2,971	14.0
Oregon	2,155	2,404	2,582	19.8
Pennsylvania	11,911	12,033	12,291	3.2
Rhode Island	944	977	1,010	7.0
South Carolina	2,629	2,849	3,025	15.1
South Dakota	674	685	704	4.5
Tennessee	4,005	4,280	4,505	12.5
Texas	11,444	12,667	13,557	18.5
Utah	1,096	1,250	1,358	23.9
Vermont	456	494	523	14.7
Virginia	4,674	5,096	5,415	15.9
Washington	3,430	3,649	3,820	11.4
West Virginia	1,773	1,783	1,826	3.0
Wisconsin	4,500	4,761	4,980	10.7
Wyoming	341	368	391	6.3
United States	206,300	220,353	231,638	12.3

Table B–2.—HMO inpatient utilization—actual versus predicted

Plan name	Enrollment [1]	Bed days *per capita* [2]	Predicted bed days *per capita* [3]	Ratio [4]
Group Health Co-Op of Puget Sound	182,273	.4337	1.110	0.391
Metro Health Plan	77,710	.6605	1.043	0.633
HIP of New York	750,927	.5260	1.227	0.429
Group Health Association	85,094	.4240	0.991	0.428
Harvard CHP	31,153	.4197	0.942	0.446
St. Louis Labor HI	38,233	.5610	1.078	0.520
Inland Health Association	2,552	.7151	1.657	0.432
Community Health Center	3,650	.6177	1.510	0.409
Columbia Medical Plan [5]	2,379	.335	0.938	0.357
Rhode Island GHA	12,824	.5029	1.061	0.474
Kaiser of Portland [6]	83,646	.4980	1.174	0.424
GHA of Sault Ste. Marie [7]	5,400	.979	1.284	0.760
Weighted average [8]	--	--	--	0.439

[1] Gorby and Associates, [1974].

[2] *Ibid.*

[3] Calculated from the formula $PD = \sum_i f_i PD_i$, where PD denotes predicted bed days, f_i denotes fraction of HMO enrollees that are in age category i (for i = 1, 0–14; i = 2, 15-64; i = 3, <65. Source: *Ibid.* exhibit 4), and PD_i denotes patient days *per capita* of the civilian population in age category i.

[4] Bed days *per capita*/predicted bed days *per capita*.

[5] See Peterson [1971].

[6] See Saward, Blank, and Greenlick [1968].

[7] See Hastings, *et al.* [1973].

[8] Weighted according to the number of enrollees in each HMO.

Table B–3.—HMO outpatient utilization—actual versus predicted

Plan name	Enrollment [1]	Visits *per capita* [2]	Predicted visits *per capita* [3]	Ratio [4]
Group Health Co-Op of Puget Sound	182,273	3.953	4.96	.797
Metro Health Plan	77,710	2.135	4.90	.436
HIP of New York	750,927	4.338 [5]	5.02	.864
Group Health Association	85,094	3.413	4.89	.698
Harvard CHP	31,153	4.139	4.86	.852
St. Louis Labor HI	38,233	4.995	4.74	1.054
Community Health Center	3,650	7.018	5.18	1.355
Yale Health Plan	19,178	4.678	4.96	.943
Rhode Island GHA	12,824	3.090	4.81	.642
Kaiser of Portland [6]	83,646	3.332	5.00	.666
Columbia Medical Plan [7]	2,359	8.000	4.85	1.650
GHA of Salt Ste. Marie [8]	5,400	--	--	.953
Weighted average [9]	--	--	--	.811

[1] See Gorby and Associates [1974].

[2] *Ibid.*

[3] Calculated from the formula $V = {}_iB_iV_i$, where V denotes predicted office visits *per capita*, B denotes fraction of HMO enrollment in age category i and V_i denotes visits *per capita* of the civilian population in age category i, see NCHS [1975a].

[4] Corrected to include visits to allied health professionals by multiplying physician visits *per capita* by 1/0.881. (Approximately 88.1 percent of office visits to HMOs are to physicians, see Greenlick [1972].)

[5] Visits *per capita*/predicted visits *per capita*.

[6] See Saward, Blank and Greenlick [1968].

[7] See Peterson [1971].

[8] See Mott, Hastings and Barclay [1973].

[9] Weighted according to the number of enrollees in each HMO.

Table B–4.—Percent increase in *per capita* utilization of health services over projection period

Setting	Percent increase 1972–1985
Hospital inpatient	[1] 6.5
Hospital outpatient	[2] 65.0
Physicians office	[3] 9.8
Nursing care homes	[4] 78.0
Personal care homes	[4] 0.0
Home health care	0.0
HMO clinic	[5] 9.8

[1] Based on average annual growth from 1970–1974, estimated from data in American Hospital Association [1975a].

[2] Based on average annual growth from 1962–1973, estimated from data in American Hospital Association [1975a].

[3] Based on analysis of physician visit data for 1970–1974 from NCHS [1973b].

[4] Based on extrapolated annual growth calculated from 1969–1973 data found in NCHS [1973a] and DHEW [1975].

[5] Assumed to be equal to physician office growth rate.

Table B–5.—Percent change in projected baseline service demands 1972–1985

State	Doctor's office visits	Hospital inpatient visits	Hospital outpatient days	Nursing care home days	Personal care home days	Home care visits	HMO visits
AL	21.5	25.2	77.0	133.5	30.5	21.0	0.0
AK	26.0	36.5	86.4	209.8	0.0	47.1	*
AZ	57.1	64.6	116.6	214.0	75.8	62.5	547.4
AR	26.9	26.8	85.4	125.5	26.1	18.3	0.0
CA	2.4	19.2	50.2	141.4	35.3	27.9	260.4
CO	35.7	34.6	102.9	104.9	15.3	18.2	356.6
CT	19.4	23.7	75.7	119.7	23.3	17.8	268.7
DL	28.4	30.7	88.0	125.4	25.0	20.2	0.0
DC	−38.9	−16.1	5.5	78.8	0.0	−5.3	252.4
FL	57.7	64.4	128.8	205.9	71.5	61.4	*
GA	30.8	33.4	91.3	151.5	40.7	28.9	0.0
HI	13.3	31.4	65.6	184.3	59.2	45.6	223.4
ID	34.8	31.6	101.0	115.9	20.8	18.2	0.0
IL	15.7	16.5	70.9	108.9	17.1	10.6	648.5
IN	21.1	21.2	79.1	111.8	18.8	13.3	*
IA	14.7	14.2	70.1	93.2	8.4	5.1	0.0
KS	15.5	17.1	70.0	108.2	16.7	11.0	*
KY	20.9	21.4	77.8	112.0	18.8	13.8	363.2
LA	28.1	26.8	79.8	134.9	31.4	22.0	0.0
ME	19.3	19.0	76.8	103.9	14.3	10.7	326.3
MD	29.5	34.0	88.9	145.3	37.4	28.1	273.8
MA	16.7	18.1	72.7	102.1	13.4	9.7	313.2
MI	19.6	21.3	76.9	113.7	19.7	13.6	282.2
MN	17.0	19.8	73.0	110.3	17.9	12.7	313.8
MS	21.2	22.9	77.5	124.9	26.0	16.1	0.0
MO	18.0	18.3	74.5	109.4	17.4	11.4	192.8
MT	22.9	21.6	83.0	96.9	10.7	10.3	0.0
NE	19.7	17.5	78.5	93.1	8.3	6.3	*
NV	58.9	65.7	133.2	237.2	89.5	69.4	*
NH	33.8	31.5	99.0	117.1	21.7	18.4	*
NJ	22.7	25.2	80.7	126.7	27.1	20.4	*
NM	32.5	42.0	93.5	178.4	56.4	42.1	820.0
NY	7.3	9.8	58.9	94.0	8.8	5.4	196.0
NC	26.5	31.3	84.1	150.1	40.0	29.1	0.0
ND	15.9	19.1	70.1	115.9	21.0	14.7	0.0
OH	16.0	18.1	71.0	111.7	18.7	12.6	258.2
OK	26.2	26.4	85.4	121.8	24.3	18.1	0.0
OR	19.7	25.8	77.0	128.1	27.8	22.0	195.9
PA	11.9	15.7	64.4	112.0	18.8	11.8	608.3
RI	14.7	19.8	67.9	130.0	28.8	20.9	327.3
SC	27.9	31.2	86.9	141.8	35.6	25.4	0.0
SD	15.6	17.1	70.3	102.5	13.7	9.5	0.0
TN	25.0	27.4	82.9	133.5	30.9	22.0	0.0
TX	31.5	32.6	93.0	136.6	32.6	25.0	*
UT	35.0	35.1	100.6	135.0	32.2	25.8	302.5
VT	24.3	23.3	84.7	105.8	15.9	10.3	0.0
VA	28.9	32.3	88.4	141.9	35.6	27.3	0.0
WA	−65.1	−12.4	−51.0	143.7	36.3	24.1	196.9
WV	12.7	13.6	65.6	101.5	12.9	7.7	430.4
WI	15.9	20.5	70.9	116.6	21.4	15.6	417.2
WY	26.7	25.8	88.6	103.9	14.2	13.0	0.0

*Indicates indefinite percent increase, i.e., no HMOs in 1972 but some enrollment by 1974 which is the last year of HMO survey data.

Table B–6.—Non-Federal physicians in private practice by State, 1972 [1]

	General practice	Pediatrics	OB/GYN	Medical specialty	Surgical specialty	Total
Alabama	670	146	183	337	562	1,898
Alaska	68	16	13	25	54	176
Arizona	474	96	136	345	514	1,565
Arkansas	539	50	75	157	331	1,152
California	6,262	1,478	1,875	4,955	6,912	21,482
Colorado	570	175	185	463	685	2,078
Connecticut	574	248	278	803	900	2,803
Delaware	120	36	47	107	136	446
District of Columbia	155	81	129	388	343	753
Florida	1,409	411	541	1,462	2,153	5,976
Georgia	831	238	338	604	1,015	3,026
Hawaii	180	84	73	164	229	730
Idaho	251	30	37	66	151	535
Illinois	2,624	540	732	1,741	2,424	8,061
Indiana	1,515	165	212	472	1,037	3,401
Iowa	830	68	110	226	511	1,745
Kansas	596	77	95	250	428	1,446
Kentucky	816	129	151	348	610	2,054
Louisiana	745	189	266	449	846	2,495
Maine	234	42	47	137	252	712
Maryland	724	282	397	764	933	3,100
Massachusetts	1,255	404	452	1,339	1,699	5,149
Michigan	1,577	374	612	1,209	1,919	5,691
Minnesota	1,121	151	201	648	891	3,012
Mississippi	530	78	108	166	374	1,256
Missouri	794	201	281	769	1,072	3,117
Montana	224	35	36	84	176	555
Nebraska	485	47	59	162	300	1,053
Nevada	128	19	36	62	152	397
New Hampshire	214	49	48	114	201	626
New Jersey	1,476	463	614	1,506	1,785	5,844
New Mexico	172	47	62	156	244	681
New York	4,330	1,467	1,762	5,204	5,343	18,106
North Carolina	1,021	264	344	644	1,006	3,279
North Dakota	164	22	27	66	137	416
Ohio	2,396	479	686	1,641	2,364	7,566
Oklahoma	577	88	148	314	504	1,631
Oregon	594	107	145	403	631	1,880
Pennsylvania	2,962	529	812	1,970	2,714	8,987
Rhode Island	182	70	73	203	277	805
South Carolina	620	96	134	205	487	1,542
South Dakota	186	17	21	48	116	388
Tennessee	799	181	233	490	1,023	2,726
Texas	2,732	530	743	1,571	2,561	8,137
Utah	249	57	87	139	299	831
Vermont	131	30	30	97	124	412
Virginia	999	285	302	663	970	3,219
Washington	1,033	190	235	548	961	2,967
West Virginia	389	65	74	199	421	1,148
Wisconsin	1,135	196	237	629	1,005	3,202
Wyoming	121	9	15	30	73	248
United States	49,931	11,433	14,735	36,103	52,248	164,450

[1] Source: *Distribution of Physicians in the United States* (AMA, 1973).

Table B–7.—Ratio of office to total physician visits and RNs to other office employees by specialty [1]

Type of practice	Office visits/ total visits [1]
General practice	0.817
Pediatrics	0.865
Obstetrics and gynecology	0.782
Medical specialty	0.721
Surgical specialty	0.647

[1] Source: *1973 Profiles of Medical Practice*, table 2.

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Table 8–8.—1972 Nursing intensity parameter values (1972 registered nurses per 1,000 service units)

State	RNPD	RNPV	RNH01	RNH02
Alabama	0.875	.1019	0.067	0.059
Alaska	2.046	.0893	0.270	*
Arizona	1.664	.1819	0.185	0.093
Arkansas	0.668	.0734	0.058	0.044
California	1.685	.1325	0.147	0.028
Colorado	1.678	.1546	0.183	0.118
Connecticut	1.500	.1840	0.289	0.138
Delaware	1.467	.1731	0.198	*
District of Columbia	1.576	.1804	0.113	*
Florida	1.269	.1697	0.165	0.082
Georgia	1.040	.1125	0.079	0.013
Hawaii	1.555	.1436	0.245	0.047
Idaho	1.485	.1280	0.161	*
Illinois	1.341	.1559	0.112	0.077
Indiana	1.127	.1293	0.114	0.088
Iowa	1.231	.1393	0.097	0.042
Kansas	1.058	.1021	0.082	0.020
Kentucky	0.973	.1357	0.081	0.031
Louisiana	0.876	.0974	0.068	0.044
Maine	1.499	.1468	0.155	0.013
Maryland	1.459	.1877	0.281	0.133
Massachusetts	1.899	.1972	0.202	0.137
Michigan	1.152	.1271	0.126	0.092
Minnesota	1.444	.2292	0.128	0.098
Mississippi	0.763	.1082	0.086	0.024
Missouri	0.890	.1255	0.090	0.048
Montana	1.292	.1561	0.187	0.136
Nebraska	1.279	.1612	0.089	0.030
Nevada	1.343	.1775	0.244	*
New Hampshire	1.902	.1314	0.260	0.210
New Jersey	1.426	.1801	0.248	0.081
New Mexico	1.429	.1331	0.115	0.081
New York	1.455	.1623	0.229	0.113
North Carolina	1.085	.1432	0.137	0.017
North Dakota	1.344	.2162	0.148	0.045
Ohio	1.197	.1668	0.123	0.075
Oklahoma	0.884	.1080	0.055	0.031
Oregon	1.743	.1275	0.144	0.045
Pennsylvania	1.396	.1258	0.201	0.133
Rhode Island	1.742	.1606	0.168	0.010
South Carolina	0.963	.1095	0.135	0.031
South Dakota	1.176	.1611	0.128	0.077
Tennessee	0.719	.1125	0.067	0.002
Texas	0.953	.1031	0.043	0.030
Utah	1.542	.1222	0.097	*
Vermont	1.754	.1587	0.284	0.021
Virginia	1.200	.1413	0.133	0.027
Washington	1.925	.1634	0.155	0.094
West Virginia	1.000	.0924	0.152	0.028
Wisconsin	1.198	.1455	0.147	0.106
Wyoming	1.517	.0991	0.147	0.102
United States	1.291	.1444	0.137	0.070

*Value less than .0005

Table B–9.—Registered nurses in outpatient and emergency departments of non-federal short-term general hospitals

Year	FTE RNs[1]	Visits(10^6)[2]	(RNs/visit)·10^{-4}
1968	16,425	114.1	1.439
1970	19,672	133.5	1.473
1972	24,118	167.0	1.444

[1] Source: BHRD [1970, 1974a, 1974b].

[2] Source: AHA [1974].

Table 8–10.—1972 FTE RN employment levels in community health, education, and other settings

State	RNBE	RNOH	RNCH	RN7	RN8	RN9
Alabama	132.	239.	227.	745.	281.	352.
Alaska	78.	9.	69.	355.	15.	18.
Arizona	484.	100.	197.	819.	367.	259.
Arkansas	106.	61.	182.	419.	103.	168.
California	2,708.	1,449.	1,253.	6,476.	2,807.	1,921.
Colorado	377.	177.	280.	1,217.	335.	335.
Connecticut	932.	463.	332.	1,231.	2,157.	491.
Delaware	220.	105.	65.	327.	185.	149.
District of Columbia	95.	238.	306.	937.	485.	207.
Florida	199.	477.	581.	2,325.	2,374.	587.
Georgia	191.	338.	471.	1,664.	994.	484.
Hawaii	49.	39.	80.	532.	108.	59.
Idaho	10.	29.	39.	90.	50.	77.
Illinois	1,508.	1,570.	586.	2,775.	1,650.	1,522.
Indiana	617.	660.	138.	774.	575.	497.
Iowa	567.	179.	114.	654.	477.	502.
Kansas	391.	95.	163.	766.	185.	363.
Kentucky	129.	227.	319.	193.	255.	380.
Louisiana	162.	209.	262.	987.	525.	376.
Maine	150.	106.	72.	477.	346.	145.
Maryland	498.	344.	587.	1,738.	825.	622.
Massachusetts	1,311.	620.	509.	3,321.	2,303.	1,512.
Michigan	462.	1,179.	534.	2,752.	819.	1,075.
Minnesota	625.	254.	219.	704.	507.	667.
Mississippi	156.	68.	199.	599.	381.	231.
Missouri	702.	385.	313.	1,698.	399.	781
Montana	64.	14.	61.	175.	116.	99.
Nebraska	230.	80.	29.	547.	164.	381.
Nevada	62.	22.	39.	152.	73.	49.
New Hampshire	251.	70.	61.	239.	292.	169.
New Jersey	2,527.	903.	403.	2,032.	2,159.	974.
New Mexico	194.	37.	109.	525.	91.	95.
New York	4,562.	2,132.	1,240.	6,853.	7,853.	3,620.
North Carolina	581.	397.	412.	1,374.	1,056.	695.
North Dakota	29.	10.	33.	197.	74.	150.
Ohio	982.	1,522.	541.	2,619.	1,895.	1,460.
Oklahoma	214.	96.	173.	793.	218.	223.
Oregon	134.	116.	213.	490.	216.	247.
Pennsylvania	3,073.	1,654.	1,007.	4,584.	4,471.	2,348.
Rhode Island	175.	87.	50.	499.	264.	163.
South Carolina	249.	263.	353.	1,034.	555.	269.
South Dakota	89.	7.	36.	365.	63.	145.
Tennessee	142.	373.	347.	1,015.	536.	404.
Texas	1,753.	643.	591.	3,161.	1,247.	1,105.
Utah	65.	44.	244.	337.	38.	158.
Vermont	170.	40.	53.	114.	144.	100.
Virginia	482.	381.	585.	1,832.	1,087.	638.
Washington	417.	187.	256.	1,138.	266.	493.
West Virginia	123.	193.	119.	432.	300.	236.
Wisconsin	274.	498.	223.	1,222.	305.	779.
Wyoming	98.	14.	14.	141.	18.	40.
United States	29,799.	19,400.	15,289.	66,433.	43,009.	28,820.

Table B–11.—Projected requirements for FTE RNs by State under baseline scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,380	9,956	11,745	155
Alaska	1,122	1,250	1,465	1,717	153
Arizona	7,192	8,293	10,488	12,949	180
Arkansas	3,588	4,053	4,960	5,972	166
California	67,412	73,597	85,346	97,701	145
Colorado	9,841	10,965	12,980	15,183	154
Connecticut	14,342	15,475	17,674	20,143	140
Delaware	2,374	2,569	2,983	3,416	144
District of Columbia	5,482	5,524	5,864	6,129	112
Florida	23,878	27,563	34,750	43,184	181
Georgia	12,155	13,434	15,929	18,828	155
Hawaii	2,864	3,150	3,719	4,316	151
Idaho	2,089	2,329	2,763	3,266	156
Illinois	40,422	43,449	49,390	56,033	139
Indiana	14,593	15,935	18,521	21,394	147
Iowa	10,249	10,975	12,449	14,086	137
Kansas	7,449	8,097	9,331	10,693	144
Kentucky	6,981	7,653	8,970	10,463	150
Louisiana	8,257	9,074	10,680	12,528	152
Maine	4,106	4,411	5,047	5,740	140
Maryland	13,690	15,249	18,189	21,534	157
Massachusetts	31,559	33,859	38,340	43,255	137
Michigan	26,448	28,874	33,540	38,640	146
Minnesota	15,619	17,023	19,749	22,711	145
Mississippi	4,824	5,282	6,190	7,247	150
Missouri	13,778	15,145	17,796	20,671	150
Montana	2,662	2,901	3,330	3,827	144
Nebraska	5,598	6,057	6,970	7,978	143
Nevada	1,552	1,826	2,360	2,943	190
New Hampshire	3,765	4,142	4,864	5,626	149
New Jersey	26,830	29,227	33,843	39,066	146
New Mexico	2,815	3,134	3,754	4,450	158
New York	80,105	84,610	93,684	103,571	129
North Carolina	14,639	16,029	18,865	22,086	151
North Dakota	2,362	2,549	2,954	3,407	144
Ohio	35,694	38,526	44,068	50,213	141
Oklahoma	5,891	6,567	7,853	9,310	158
Oregon	7,422	8,154	9,530	10,974	148
Pennsylvania	52,420	55,856	62,827	70,739	135
Rhode Island	3,958	4,273	4,904	5,619	142
South Carolina	6,901	7,539	8,854	10,365	150
South Dakota	2,485	2,692	3,114	3,594	145
Tennessee	9,100	10,112	12,117	14,365	158
Texas	27,380	30,471	36,417	43,178	158
Utah	3,079	3,420	4,055	4,770	155
Vermont	2,240	2,413	2,814	3,242	145
Virginia	14,468	15,829	18,547	21,645	150
Washington	12,161	12,803	14,106	15,522	128
West Virginia	5,183	5,529	6,270	7,136	138
Wisconsin	15,503	16,985	20,028	23,275	150
Wyoming	1,189	1,287	1,495	1,742	147
United States	703,313	764,535	884,689	1,018,184	145

Table 8–12.—Health insurance coverage by State

	Fraction of population with hospital insurance	Fraction of population with ambulatory insurance
Alabama	0.80	0.60
Alaska	0.42	0.34
Arizona	0.63	0.50
Arkansas	0.69	0.56
California	0.89	0.77
Colorado	0.82	0.73
Connecticut	0.80	0.77
Delaware	0.90	0.89
District of Columbia	[1] 0.99	[1] 0.99
Florida	0.81	0.64
Georgia	0.90	0.59
Hawaii	0.86	0.78
Idaho	0.77	0.56
Illinois	0.92	0.75
Indiana	0.87	0.73
Iowa	0.84	0.72
Kansas	0.82	0.66
Kentucky	0.77	0.68
Louisiana	0.71	0.43
Maine	0.89	0.78
Maryland	0.73	0.64
Massachusetts	0.84	0.79
Michigan	0.92	0.80
Minnesota	0.80	0.66
Mississippi	0.77	0.57
Missouri	0.92	0.72
Montana	0.75	0.59
Nebraska	0.90	0.71
Nevada	0.69	0.58
New Hampshire	0.76	0.71
New Jersey	0.82	0.78
New Mexico	0.72	0.58
New York	[1] 0.99	0.92
North Carolina	0.76	0.52
North Dakota	0.82	0.70
Ohio	0.91	0.78
Oklahoma	0.78	0.65
Oregon	0.75	0.61
Pennsylvania	0.97	0.81
Rhode Island	0.88	0.88
South Carolina	0.85	0.53
South Dakota	0.86	0.63
Tennessee	0.81	0.65
Texas	0.75	0.60
Utah	0.67	0.65
Vermont	0.74	0.72
Virginia	0.67	0.54
Washington	0.95	0.73
West Virginia	0.89	0.83
Wisconsin	0.83	0.78
Wyoming	0.74	0.64
United States	0.86	0.66

[1] Values for these cases are arbitrarily set to 0.99 since data indicate that the number insured exceeds the population.

Table B–13.—Projected requirements for FTE RNs by State under NHI 1 scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,380	10,715	12,616	166
Alaska	1,122	1,250	1,849	2,153	192
Arizona	7,192	8,293	12,016	14,807	206
Arkansas	3,588	4,053	5,478	6,583	183
California	67,412	73,597	88,244	100,752	149
Colorado	9,841	10,965	13,771	16,115	164
Connecticut	14,342	15,475	18,676	21,284	148
Delaware	2,374	2,569	3,097	3,552	150
District of Columbia	5,482	5,524	5,946	6,209	113
Florida	23,878	27,563	37,691	46,824	196
Georgia	12,155	13,434	17,053	20,134	166
Hawaii	2,864	3,150	3,928	4,545	159
Idaho	2,089	2,329	3,116	3,672	176
Illinois	40,422	43,449	51,861	58,803	145
Indiana	14,593	15,935	19,979	23,051	158
Iowa	10,249	10,975	13,275	14,976	146
Kansas	7,449	8,097	10,136	11,559	155
Kentucky	6,981	7,653	9,777	11,399	163
Louisiana	8,257	9,074	12,055	14,118	171
Maine	4,106	4,411	5,257	5,984	146
Maryland	13,690	15,249	20,021	23,687	173
Massachusetts	31,559	33,859	40,088	45,266	143
Michigan	26,448	28,874	35,004	40,318	152
Minnesota	15,619	17,023	21,028	24,155	155
Mississippi	4,824	5,282	6,823	7,974	165
Missouri	13,778	15,145	18,610	21,582	157
Montana	2,662	2,901	3,705	4,249	160
Nebraska	5,598	6,057	7,345	8,404	150
Nevada	1,552	1,826	2,663	3,311	213
New Hampshire	3,765	4,142	5,258	6,089	162
New Jersey	26,830	29,227	35,925	41,481	155
New Mexico	2,815	3,134	4,191	4,955	176
New York	80,105	84,610	95,967	106,182	133
North Carolina	14,639	16,029	21,246	24,807	169
North Dakota	2,362	2,549	3,155	3,626	154
Ohio	35,694	38,526	46,445	52,871	148
Oklahoma	5,891	6,567	8,504	10,070	171
Oregon	7,422	8,154	10,561	12,122	163
Pennsylvania	52,420	55,856	64,879	73,061	139
Rhode Island	3,958	4,273	5,051	5,789	146
South Carolina	6,901	7,539	9,817	11,454	166
South Dakota	2,485	2,692	3,374	3,882	156
Tennessee	9,100	10,112	12,958	15,352	169
Texas	27,380	30,471	40,161	47,567	174
Utah	3,079	3,420	4,554	5,362	174
Vermont	2,240	2,413	3,044	3,508	157
Virginia	14,468	15,829	20,963	24,438	169
Washington	12,161	12,803	14,333	15,585	128
West Virginia	5,183	5,529	6,499	7,396	143
Wisconsin	15,503	16,985	20,960	24,326	157
Wyoming	1,189	1,287	1,653	1,921	162
United States	703,313	764,535	938,706	1,079,923	154

Table B–14.—Projected requirements for RNs by State for NHI 2 scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,380	11,339	13,303	175
Alaska	1,122	1,250	2,000	2,317	207
Arizona	7,192	8,293	12,724	15,596	217
Arkansas	3,588	4,053	5,821	6,968	194
California	67,412	73,597	92,941	105,292	156
Colorado	9,841	10,965	14,598	17,029	173
Connecticut	14,342	15,475	19,647	22,329	156
Delaware	2,374	2,569	3,365	3,846	162
District of Columbia	5,482	5,524	6,052	6,280	115
Florida	23,878	27,563	40,211	49,643	208
Georgia	12,155	13,434	18,176	21,411	176
Hawaii	2,864	3,150	4,231	4,868	170
Idaho	2,089	2,329	3,373	3,973	190
Illinois	40,422	43,449	55,562	62,755	155
Indiana	14,593	15,935	21,853	25,100	172
Iowa	10,249	10,975	14,391	16,202	158
Kansas	7,449	8,097	10,987	12,490	168
Kentucky	6,981	7,653	10,376	12,058	173
Louisiana	8,257	9,074	12,815	14,956	181
Maine	4,106	4,411	5,544	6,297	153
Maryland	13,690	15,249	21,059	24,843	181
Massachusetts	31,559	33,859	41,629	46,927	149
Michigan	26,448	28,874	37,415	42,947	162
Minnesota	15,619	17,023	22,009	25,213	161
Mississippi	4,824	5,282	7,291	8,490	176
Missouri	13,778	15,145	19,663	22,740	165
Montana	2,662	2,901	4,031	4,604	173
Nebraska	5,598	6,057	7,863	8,970	160
Nevada	1,552	1,826	2,861	3,530	227
New Hampshire	3,765	4,142	5,555	6,416	170
New Jersey	26,830	29,227	38,219	43,993	164
New Mexico	2,815	3,134	4,457	5,256	187
New York	80,105	84,610	99,641	109,867	137
North Carolina	14,639	16,029	22,845	26,564	181
North Dakota	2,362	2,549	3,376	3,870	164
Ohio	35,694	38,526	50,435	57,101	160
Oklahoma	5,891	6,567	9,094	10,723	182
Oregon	7,422	8,154	11,382	12,991	175
Pennsylvania	52,420	55,856	68,412	76,847	147
Rhode Island	3,958	4,273	5,232	5,981	151
South Carolina	6,901	7,539	10,670	12,388	180
South Dakota	2,485	2,692	3,658	4,191	169
Tennessee	9,100	10,112	13,662	16,135	177
Texas	27,380	30,471	42,993	50,735	185
Utah	3,079	3,420	4,833	5,674	184
Vermont	2,240	2,413	3,214	3,696	165
Virginia	14,468	15,829	22,351	25,966	179
Washington	12,161	12,803	14,813	15,661	129
West Virginia	5,183	5,529	6,902	7,828	151
Wisconsin	15,503	16,985	22,112	25,550	165
Wyoming	1,189	1,287	1,793	2,075	175
United States	703,313	764,535	995,474	1,140,477	162

Table B–15.—Projected requirements for FTE RNs by State under average HMO growth scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,380	9,947	11,716	154
Alaska	1,122	1,250	1,453	1,691	151
Arizona	7,192	8,293	10,479	12,912	180
Arkansas	3,588	4,053	4,960	5,972	166
California	67,412	73,575	84,916	96,521	143
Colorado	9,841	10,959	12,959	15,127	154
Connecticut	14,342	15,473	17,628	20,027	140
Delaware	2,374	2,569	2,983	3,416	144
District of Columbia	5,482	5,521	5,785	5,926	108
Florida	23,878	27,552	34,626	42,812	179
Georgia	12,155	13,434	15,909	18,769	154
Hawaii	2,864	3,146	3,680	4,218	147
Idaho	2,089	2,329	2,732	3,177	152
Illinois	40,422	43,441	49,256	55,652	138
Indiana	14,593	15,935	18,477	21,277	146
Iowa	10,249	10,975	12,440	14,057	137
Kansas	7,449	8,097	9,321	10,667	143
Kentucky	6,981	7,653	8,954	10,421	149
Louisiana	8,257	9,074	10,653	12,449	151
Maine	4,106	4,411	5,041	5,722	139
Maryland	13,690	15,249	18,132	21,386	156
Massachusetts	31,559	33,845	38,173	42,791	136
Michigan	26,448	28,867	33,444	38,383	145
Minnesota	15,619	17,019	19,687	22,531	144
Mississippi	4,824	5,282	6,180	7,221	150
Missouri	13,778	15,145	17,750	20,550	149
Montana	2,662	2,901	3,305	3,768	142
Nebraska	5,598	6,055	6,932	7,876	141
Nevada	1,552	1,826	2,360	2,943	190
New Hampshire	3,765	4,142	4,864	5,626	149
New Jersey	26,830	29,217	33,672	38,600	144
New Mexico	2,815	3,131	3,750	4,433	157
New York	80,105	84,603	93,427	102,887	128
North Carolina	14,639	16,029	18,841	22,024	150
North Dakota	2,362	2,549	2,932	3,354	142
Ohio	35,694	38,522	43,985	49,986	140
Oklahoma	5,891	6,567	7,835	9,257	157
Oregon	7,422	8,152	9,469	10,809	146
Pennsylvania	52,420	55,845	62,721	70,442	134
Rhode Island	3,958	4,273	4,895	5,596	141
South Carolina	6,901	7,539	8,854	10,365	150
South Dakota	2,485	2,692	3,094	3,545	143
Tennessee	9,100	10,112	12,091	14,287	157
Texas	27,380	30,467	36,336	42,942	157
Utah	3,079	3,420	4,049	4,754	154
Vermont	2,240	2,413	2,805	3,212	143
Virginia	14,468	15,829	18,522	21,590	149
Washington	12,161	12,796	14,043	15,397	127
West Virginia	5,183	5,529	6,257	7,099	137
Wisconsin	15,503	16,985	20,006	23,208	150
Wyoming	1,189	1,287	1,474	1,690	142
United States	703,313	764,404	882,084	1,011,081	144

Table B–16.—Projected requirements for FTE RNs by State under high HMO growth scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,380	9,939	11,691	154
Alaska	1,122	1,250	1,446	1,670	149
Arizona	7,192	8,292	10,471	12,888	179
Arkansas	3,588	4,053	4,960	5,972	166
California	67,412	73,554	84,490	95,425	142
Colorado	9,841	10,958	12,942	15,074	153
Connecticut	14,342	15,469	17,587	19,915	139
Delaware	2,374	2,569	2,983	3,416	144
District of Columbia	5,482	5,519	5,718	5,746	105
Florida	23,878	27,546	34,508	42,467	178
Georgia	12,155	13,434	15,885	18,711	154
Hawaii	2,864	3,145	3,651	4,130	144
Idaho	2,089	2,329	2,701	3,095	148
Illinois	40,422	43,435	49,128	55,289	137
Indiana	14,593	15,933	18,436	21,170	145
Iowa	10,249	10,975	12,425	14,031	137
Kansas	7,449	8,097	9,308	10,641	143
Kentucky	6,981	7,653	8,940	10,382	149
Louisiana	8,257	9,073	10,627	12,373	150
Maine	4,106	4,411	5,033	5,698	139
Maryland	13,690	15,245	18,081	21,244	155
Massachusetts	31,559	33,842	38,009	42,340	134
Michigan	26,448	28,865	33,357	38,138	144
Minnesota	15,619	17,017	19,623	22,355	143
Mississippi	4,824	5,282	6,172	7,195	149
Missouri	13,778	15,141	17,708	20,425	148
Montana	2,662	2,901	3,286	3,701	139
Nebraska	5,598	6,051	6,898	7,776	139
Nevada	1,552	1,826	2,360	2,943	190
New Hampshire	3,765	4,142	4,864	5,626	149
New Jersey	26,830	29,210	33,507	38,158	142
New Mexico	2,815	3,131	3,746	4,420	157
New York	80,105	84,587	93,195	102,209	128
North Carolina	14,639	16,029	18,820	21,964	150
North Dakota	2,362	2,549	2,918	3,297	140
Ohio	35,694	38,519	43,908	49,753	139
Oklahoma	5,891	6,567	7,819	9,209	156
Oregon	7,422	8,147	9,408	10,655	144
Pennsylvania	52,420	55,842	62,608	70,152	134
Rhode Island	3,958	4,270	4,885	5,578	141
South Carolina	6,901	7,539	8,854	10,365	150
South Dakota	2,485	2,692	3,080	3,495	141
Tennessee	9,100	10,112	12,066	14,207	156
Texas	27,380	30,461	36,256	42,721	156
Utah	3,079	3,415	4,045	4,735	154
Vermont	2,240	2,413	2,791	3,184	142
Virginia	14,468	15,829	18,502	21,528	149
Washington	12,161	12,792	13,976	15,277	126
West Virginia	5,183	5,523	6,239	7,061	136
Wisconsin	15,503	16,984	19,985	23,142	149
Wyoming	1,189	1,287	1,458	1,638	138
United States	703,313	764,282	879,601	1,004,272	143

Table B–17.—Values of parameters specifying acceptance of role reformulation concepts summarized for high and moderate growth scenarios

Parameter	1972 values	1985 values	
		Moderate growth	High growth
Fraction of inpatient units with primary nursing by 1985	0.03	0.40	0.80
Fraction of clinical nurse specialist roles new by 1985	0.00	0.75	1.00
Fraction of unsatisfied office visits provided by nurses in practitioner roles by 1985	0.20	0.65	1.00

Table B–18.—Projected requirements for FTE RNs by State under the moderate acceptance of role reformulation scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,609	10,639	12,981	171
Alaska	1,122	1,250	1,465	1,719	153
Arizona	7,192	8,330	10,645	13,323	185
Arkansas	3,588	4,222	5,466	6,885	192
California	67,412	73,743	85,735	98,305	146
Colorado	9,841	10,970	13,018	15,289	155
Connecticut	14,342	15,502	17,759	20,305	142
Delaware	2,374	2,578	3,014	3,475	146
District of Columbia	5,482	5,529	5,875	6,150	112
Florida	23,878	27,820	35,730	45,358	190
Georgia	12,155	13,689	16,715	20,300	167
Hawaii	2,864	3,151	3,723	4,323	151
Idaho	2,089	2,350	2,830	3,395	163
Illinois	40,422	43,573	49,793	56,810	141
Indiana	14,593	16,097	19,013	22,294	153
Iowa	10,249	11,038	12,643	14,441	141
Kansas	7,449	8,207	9,652	11,261	151
Kentucky	6,981	7,812	9,440	11,305	162
Louisiana	8,257	9,307	11,375	13,791	167
Maine	4,106	4,539	5,418	6,389	156
Maryland	13,690	15,190	18,037	21,305	156
Massachusetts	31,559	33,742	38,032	42,765	136
Michigan	26,448	29,159	34,401	40,198	152
Minnesota	15,619	17,087	19,952	23,[illegible]88	148
Mississippi	4,824	5,451	6,685	8,135	169
Missouri	13,778	15,412	18,580	22,065	160
Montana	2,662	2,922	3,396	3,951	148
Nebraska	5,598	6,117	7,149	8,300	148
Nevada	1,552	1,847	2,435	3,105	200
New Hampshire	3,765	4,137	4,857	5,627	149
New Jersey	26,830	29,240	33,910	39,239	146
New Mexico	2,815	3,169	3,865	4,665	166
New York	80,105	84,748	94,095	104,330	130
North Carolina	14,639	16,225	19,473	23,220	159
North Dakota	2,362	2,577	3,037	3,555	151
Ohio	35,694	38,795	44,876	51,669	145
Oklahoma	5,891	6,752	8,406	10,311	175
Oregon	7,422	8,168	9,577	11,062	149
Pennsylvania	52,420	55,863	62,901	70,971	135
Rhode Island	3,958	4,272	4,906	5,628	142
South Carolina	6,901	7,647	9,184	10,980	159
South Dakota	2,485	2,715	3,184	3,720	150
Tennessee	9,100	10,415	13,028	16,020	176
Texas	27,380	31,213	38,692	47,407	173
Utah	3,079	3,431	4,095	4,856	158
Vermont	2,240	2,412	2,815	3,247	145
Virginia	14,468	15,956	18,952	22,422	155
Washington	12,161	12,787	14,065	15,4[illegible]	127
West Virginia	5,183	5,629	6,558	7,643	147
Wisconsin	15,503	17,112	20,417	23,983	155
Wyoming	1,189	1,293	1,514	1,779	150
United States	703,312	769,796	901,019	1,048,833	149

Table B–19.—Projected requirements for FTE RNs by State under the high acceptance of role reformulation scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,834	11,312	14,196	187
Alaska	1,122	1,249	1,465	1,719	153
Arizona	7,192	8,362	10,780	13,643	190
Arkansas	3,588	4,390	5,966	7,787	217
California	67,412	73,847	86,024	98,761	147
Colorado	9,841	10,969	13,037	15,354	156
Connecticut	14,342	15,522	17,825	20,436	142
Delaware	2,374	2,586	3,041	3,528	149
District of Columbia	5,482	5,533	5,843	6,165	112
Florida	23,878	28,057	36,616	47,302	198
Georgia	12,155	13,937	17,477	21,721	179
Hawaii	2,864	3,151	3,724	4,324	151
Idaho	2,089	2,370	2,893	3,515	168
Illinois	40,422	43,679	50,145	57,491	142
Indiana	14,593	16,250	19,479	23,143	159
Iowa	10,249	11,098	12,826	14,775	144
Kansas	7,449	8,314	9,966	11,817	159
Kentucky	6,981	7,967	9,900	12,131	174
Louisiana	8,257	9,535	12,057	15,027	182
Maine	4,106	4,666	5,786	7,033	171
Maryland	13,690	15,120	17,849	21,002	153
Massachusetts	31,559	33,610	37,686	42,206	134
Michigan	26,448	29,432	35,226	41,693	158
Minnesota	15,619	17,146	20,142	23,445	150
Mississippi	4,824	5,618	7,175	9,013	187
Missouri	13,778	15,668	19,334	23,403	170
Montana	2,662	2,941	3,455	4,062	153
Nebraska	5,598	6,175	7,324	8,614	154
Nevada	1,552	1,866	2,504	3,253	210
New Hampshire	3,765	4,130	4,842	5,611	149
New Jersey	26,830	29,240	33,942	39,349	147
New Mexico	2,815	3,202	3,972	4,870	173
New York	80,105	84,839	94,388	104,888	131
North Carolina	14,639	16,414	20,061	24,316	166
North Dakota	2,362	2,604	3,117	3,700	157
Ohio	35,694	39,050	45,644	53,058	149
Oklahoma	5,891	6,935	8,950	11,296	192
Oregon	7,422	8,178	9,615	11,135	150
Pennsylvania	52,420	55,841	62,889	71,036	136
Rhode Island	3,958	4,270	4,902	5,626	142
South Carolina	6,901	7,751	9,507	11,579	168
South Dakota	2,485	2,739	3,252	3,843	155
Tennessee	9,100	10,712	13,924	17,646	194
Texas	27,380	31,935	40,907	51,514	188
Utah	3,079	3,439	4,126	4,925	160
Vermont	2,240	2,410	2,813	3,247	145
Virginia	14,468	16,075	19,333	23,151	160
Washington	12,161	12,766	14,011	15,426	127
West Virginia	5,183	5,728	6,842	8,142	157
Wisconsin	15,503	17,232	20,785	24,655	159
Wyoming	1,189	1,298	1,532	1,814	153
United States	703,312	774,681	916,251	1,077,383	153

Table B–20.—Projected requirements for FTE RNs under the first combination scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,609	11,500	14,009	184
Alaska	1,122	1,250	1,842	2,133	190
Arizona	7,192	8,330	12,317	15,476	215
Arkansas	3,588	4,222	6,099	7,708	215
California	67,412	73,720	88,330	100,141	149
Colorado	9,841	10,964	13,847	16,277	165
Connecticut	14,342	15,500	18,764	21,395	149
Delaware	2,374	2,578	3,133	3,621	153
District of Columbia	5,482	5,527	5,872	6,013	110
Florida	23,878	27,809	39,014	49,561	208
Georgia	12,155	13,689	17,997	21,870	180
Hawaii	2,864	3,147	3,894	4,439	155
Idaho	2,089	2,350	3,167	3,731	179
Illinois	40,422	43,565	52,252	59,368	147
Indiana	14,593	16,097	20,500	23,877	164
Iowa	10,249	11,038	13,492	15,353	150
Kansas	7,449	8,207	10,495	12,161	163
Kentucky	6,981	7,812	10,313	12,330	177
Louisiana	8,257	9,307	12,954	15,671	190
Maine	4,106	4,539	5,634	6,631	161
Maryland	13,690	15,189	19,918	23,465	171
Massachusetts	31,559	33,728	39,654	44,331	140
Michigan	26,448	29,152	35,845	41,709	158
Minnesota	15,619	17,083	21,264	24,450	157
Mississippi	4,824	5,451	7,393	8,972	186
Missouri	13,778	15,411	19,411	22,933	166
Montana	2,662	2,922	3,764	4,337	163
Nebraska	5,598	6,116	7,507	8,609	154
Nevada	1,552	1,847	2,777	3,556	229
New Hampshire	3,765	4,137	5,271	6,131	163
New Jersey	26,830	29,229	35,890	41,221	154
New Mexico	2,815	3,166	4,345	5,240	186
New York	80,105	84,741	96,160	106,260	133
North Carolina	14,639	16,225	22,086	26,327	180
North Dakota	2,362	2,577	3,220	3,715	157
Ohio	35,694	38,791	47,285	54,254	152
Oklahoma	5,891	6,752	9,131	11,160	189
Oregon	7,422	8,165	10,597	12,038	162
Pennsylvania	52,420	55,852	64,935	73,103	139
Rhode Island	3,958	4,272	5,049	5,782	146
South Carolina	6,901	7,647	10,258	12,276	178
South Dakota	2,485	2,715	3,433	3,949	159
Tennessee	9,100	10,415	13,977	17,137	188
Texas	27,380	31,208	42,952	52,609	192
Utah	3,079	3,430	4,622	5,499	179
Vermont	2,240	2,412	3,043	3,490	156
Virginia	14,468	15,956	21,601	25,617	177
Washington	12,161	12,780	14,218	15,416	127
West Virginia	5,183	5,629	6,784	7,876	152
Wisconsin	15,503	17,112	21,385	25,049	162
Wyoming	1,189	1,293	1,654	1,900	160
United States	703,312	769,661	956,840	1,110,170	158

Table B–21.—Projected Requirements for FTE RNs under the second combination scenario

State	1972	1975	1980	1985	Percent change
Alabama	7,596	8,834	13,397	16,902	223
Alaska	1,122	1,249	2,024	2,331	208
Arizona	7,192	8,361	13,761	17,798	247
Arkansas	3,588	4,390	7,388	9,809	273
California	67,412	73,801	94,596	104,741	155
Colorado	9,841	10,963	15,151	18,079	184
Connecticut	14,342	15,515	20,368	23,369	163
Delaware	2,374	2,586	3,536	4,165	175
District of Columbia	5,482	5,528	5,917	5,862	107
Florida	23,878	28,039	44,793	58,622	246
Georgia	12,155	13,937	20,877	26,327	217
Hawaii	2,864	3,146	4,239	4,685	164
Idaho	2,089	2,370	3,565	4,186	200
Illinois	40,422	43,665	57,755	65,999	163
Indiana	14,593	16,248	23,562	27,924	191
Iowa	10,249	11,098	15,147	17,466	170
Kansas	7,449	8,314	11,980	14,172	190
Kentucky	6,981	7,967	11,909	14,670	210
Louisiana	8,257	9,535	15,232	19,007	230
Maine	4,106	4,666	6,428	7,793	190
Maryland	13,690	15,115	21,592	25,586	187
Massachusetts	31,559	33,593	41,502	45,989	146
Michigan	26,448	29,423	40,181	47,318	179
Minnesota	15,619	17,140	23,121	26,760	171
Mississippi	4,824	5,618	8,743	10,995	228
Missouri	13,778	15,664	21,918	26,374	191
Montana	2,662	2,941	4,245	4,870	183
Nebraska	5,598	6,170	8,394	9,699	173
Nevada	1,552	1,866	3,207	4,262	275
New Hampshire	3,765	4,130	5,712	6,746	179
New Jersey	26,830	29,223	39,203	44,999	168
New Mexico	2,815	3,199	4,927	6,106	217
New York	80,105	84,815	101,974	112,272	140
North Carolina	14,639	16,414	25,420	31,157	213
North Dakota	2,362	2,604	3,604	4,146	176
Ohio	35,694	39,042	53,519	62,061	174
Oklahoma	5,891	6,935	10,764	13,588	231
Oregon	7,422	8,170	11,691	13,207	178
Pennsylvania	52,420	55,828	69,640	78,503	150
Rhode Island	3,958	4,267	5,336	6,134	155
South Carolina	6,901	7,751	11,994	14,837	215
South Dakota	2,485	2,739	3,858	4,426	178
Tennessee	9,100	10,712	16,351	20,725	228
Texas	27,380	31,924	50,788	64,646	236
Utah	3,079	3,433	5,148	6,263	203
Vermont	2,240	2,410	3,278	3,774	168
Virginia	14,468	16,075	24,546	29,924	207
Washington	12,161	12,755	14,521	15,260	125
West Virginia	5,183	5,721	7,625	9,012	174
Wisconsin	15,503	17,231	23,571	27,938	180
Wyoming	1,189	1,298	1,828	2,058	173
United States	703,312	774,414	1,059,825	1,243,538	177

Appendix C

STATE PROJECTIONS TABLES

This appendix provides a tabulation of baseline nurse requirement projections for each practice setting by State. The projections are presented alphabetically by State, with the last table totaling the State results to provide an estimate of the Nation's requirements. Readers should be cautioned that projections at this level of detail are potentially much less accurate since minor variations in the employment behavior of RNs and the population's demand for their services in each setting can produce a significantly different set of setting-specific results. A greater degree of confidence is provided in the aggregate of these setting-specific results shown in the last column. These totals correspond to the baseline results reported in appendix B.

ALABAMA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	4650	190	370	340	730	0	750	240	330	7600
1973	4840	200	370	370	750	0	770	230	320	7860
1974	5040	210	380	400	760	0	790	220	340	8140
1975	5210	220	370	430	780	0	820	210	350	8380
1976	5430	230	380	460	790	0	840	200	360	8690
1977	5650	250	380	490	810	0	870	190	370	9010
1978	5890	260	390	530	820	0	890	180	380	9350
1979	6130	270	400	560	840	0	920	170	400	9680
1980	6330	280	390	590	850	0	940	160	410	9960
1981	6570	290	400	630	870	0	970	150	420	10310
1982	6830	300	410	660	880	0	990	140	440	10660
1983	7090	320	420	700	900	0	1020	140	450	11030
1984	7370	330	430	740	910	0	1040	130	470	11430
1985	7600	340	430	780	930	0	1070	120	480	11740

ALASKA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	360	10	150	50	160	0	350	10	20	1120
1973	370	10	160	50	170	0	370	10	20	1160
1974	380	10	150	50	170	0	380	10	20	1180
1975	400	10	160	70	180	10	390	10	20	1250
1976	410	20	150	80	190	10	400	10	20	1290
1977	420	20	150	80	190	10	410	10	20	1320
1978	440	20	150	90	200	10	430	10	20	1370
1979	460	20	160	100	200	10	440	10	20	1420
1980	480	20	170	100	210	20	450	10	20	1470
1981	480	20	170	110	210	20	460	10	20	1490
1982	500	20	170	110	210	20	470	10	20	1550
1983	520	20	180	120	220	20	490	10	20	1600
1984	540	20	190	130	230	20	500	10	20	1660
1985	560	20	190	150	230	20	510	10	30	1720

ARIZONA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	3810	270	610	370	750	10	820	310	240	7190
1973	4000	290	650	410	770	10	850	300	240	7520
1974	4450	340	800	490	800	20	870	280	270	8330
1975	4430	340	730	510	820	20	900	270	270	8290
1976	4650	360	770	560	840	20	930	260	280	8680
1977	4880	390	810	620	870	30	960	240	290	9080
1978	5110	410	860	670	890	30	980	230	310	9500
1979	5350	440	910	730	920	30	1010	220	320	9930
1980	5660	470	990	800	940	40	1040	210	340	10490
1981	5900	500	1030	860	960	40	1070	200	350	10910
1982	6180	530	1080	930	990	40	1090	190	370	11390
1983	6450	560	1130	990	1010	40	1120	180	380	11870
1984	6730	590	1180	1070	1040	50	1150	170	400	12360
1985	7060	630	1250	1150	1060	50	1170	160	420	12950

ARKANSAS

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1980	70	180	340	360	0	420	90	160	3590
1973	2070	70	190	360	370	0	430	80	160	3740
1974	2200	80	200	400	380	0	450	80	160	3940
1975	2270	80	190	420	390	0	460	80	170	4050
1976	2390	80	190	450	400	0	480	70	180	4240
1977	2490	90	200	480	410	0	490	70	180	4400
1978	2610	90	200	510	420	0	500	60	190	4590
1979	2740	100	210	550	430	0	520	60	200	4790
1980	2850	100	210	570	430	0	530	60	210	4960
1981	2970	110	210	600	440	0	550	60	210	5150
1982	3090	110	220	640	450	0	560	50	220	5350
1983	3230	120	230	670	460	0	570	50	230	5560
1984	3360	120	230	710	470	0	590	50	240	5770
1985	3490	120	240	740	480	0	600	50	250	5970

CALIFORNIA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	37690	2470	3910	5700	5990	1000	6480	2400	1780	67410
1973	38510	2560	3790	6170	6130	1190	6690	2280	1780	69100
1974	39440	2650	3640	6670	6280	1380	6910	2170	1830	70970
1975	40820	2770	3620	7280	6440	1590	7130	2060	1890	73600
1976	41830	2860	3490	7800	6590	1790	7340	1950	1950	75600
1977	42900	2950	3380	8340	6730	1970	7560	1860	2000	77700
1978	44080	3050	3290	8900	6880	2140	7780	1760	2060	79940
1979	45260	3150	3220	9460	7020	2310	7990	1680	2120	82200
1980	46950	3290	3270	10160	7190	2490	8210	1590	2200	85350
1981	48140	3380	3190	10750	7330	2680	8430	1510	2260	87660
1982	49310	3460	3080	11340	7470	2890	8640	1440	2310	89950
1983	50460	3540	2970	11960	7620	3120	8860	1370	2370	92260
1984	51610	3600	2820	12610	7760	3360	9080	1300	2430	94570
1985	53200	3700	2770	13440	7930	3620	9300	1230	2510	97700

COLORADO

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	5060	300	680	980	990	20	1220	290	310	9840
1973	5220	320	690	1050	1010	20	1260	270	310	10160
1974	5560	360	770	1170	1040	30	1300	260	330	10820
1975	5620	370	740	1210	1060	40	1340	250	340	10970
1976	5810	390	760	1280	1080	40	1380	230	350	11330
1977	6020	410	780	1360	1110	50	1420	220	360	11720
1978	6220	430	800	1430	1130	50	1460	210	370	12100
1979	6420	460	820	1490	1150	60	1500	200	380	12480
1980	6690	480	860	1580	1180	60	1540	190	400	12980
1981	6910	510	890	1650	1200	70	1580	180	410	13410
1982	7140	530	920	1720	1220	70	1620	170	420	13830
1983	7370	560	940	1800	1240	80	1670	160	440	14260
1984	7590	590	970	1870	1270	80	1710	150	450	14670
1985	7870	610	1010	1960	1290	90	17[illegible]0	150	460	15180

CONNECTICUT

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	5640	490	700	2130	1840	10	1230	1840	460	14340
1973	5790	510	700	2290	1880	10	1270	1750	450	14650
1974	5900	530	680	2420	1920	20	1310	1660	460	14910
1975	6160	560	710	2640	1970	20	1350	1580	480	15480
1976	6330	590	710	2810	2020	20	1400	1500	490	15870
1977	6510	620	710	2980	2060	20	1440	1430	500	16260
1978	6710	640	710	3150	2100	20	1480	1360	510	16690
1979	6910	670	720	3340	2140	20	1520	1290	530	17140
1980	7150	700	730	3540	2190	20	1560	1220	540	17670
1981	7350	730	740	3720	2230	30	1600	1160	560	18130
1982	7550	760	740	3890	2270	30	1640	1100	570	18570
1983	7760	790	750	4080	2320	30	1680	1050	590	19040
1984	7970	820	750	4270	2360	30	1730	1000	600	19530
1985	8230	850	770	4510	2410	40	1770	950	620	20140

DELAWARE

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	950	80	200	150	370	0	330	160	140	2370
1973	980	90	200	160	380	0	340	150	130	2440
1974	1000	90	200	170	390	0	350	140	140	2490
1975	1040	100	210	190	400	0	360	140	140	2570
1976	1070	110	210	200	400	0	370	130	140	2630
1977	1110	110	220	210	410	0	380	120	150	2720
1978	1140	120	220	230	420	0	390	120	150	2790
1979	1180	120	230	240	430	0	400	110	160	2880
1980	1230	130	240	260	440	0	410	100	160	2980
1981	1270	140	240	280	450	0	430	100	170	3070
1982	1300	140	240	290	460	0	440	90	170	3140
1983	1340	150	250	310	470	0	450	90	180	3230
1984	1380	150	250	320	480	0	460	90	180	3320
1985	1430	160	260	340	490	0	470	80	190	3420

DISTRICT OF COLUMBIA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	2730	210	120	100	750	30	940	410	190	5480
1973	2760	210	110	110	760	40	970	390	190	5540
1974	2640	200	90	110	770	50	1000	370	180	5420
1975	2700	210	80	120	780	60	1030	360	190	5520
1976	2750	220	80	130	800	60	1060	340	190	5620
1977	2790	220	70	130	810	70	1090	320	190	5700
1978	2820	220	70	140	830	70	1120	300	200	5770
1979	2880	230	60	150	840	80	1160	290	200	5890
1980	2840	230	50	150	850	80	1190	280	200	5860
1981	2860	230	50	160	870	90	1220	260	200	5930
1982	2910	230	40	160	880	100	1250	250	200	6020
1983	2920	230	40	170	890	100	1280	240	210	6070
1984	2970	230	30	180	910	110	1310	220	210	6180
1985	2900	220	20	180	920	120	1340	210	210	6130

FLORIDA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	13190	790	1750	1650	1610	0	2320	2030	540	23880
1973	13880	850	1850	1820	1650	0	2400	1930	560	24940
1974	15440	970	2270	2140	1720	0	2480	1830	610	27470
1975	15560	990	2120	2240	1750	0	2560	1740	610	27560
1976	16370	1060	2240	2450	1790	0	2640	1650	640	28840
1977	17200	1130	2370	2660	1830	0	2710	1570	670	30150
1978	18070	1200	2500	2890	1880	0	2790	1490	700	31530
1979	18990	1270	2660	3130	1920	0	2870	1420	730	32990
1980	20090	1360	2840	3410	1970	0	2950	1350	770	34750
1981	21050	1440	2970	3660	2020	0	3030	1280	810	36280
1982	22030	1530	3100	3920	2060	0	3100	1220	840	37810
1983	23060	1610	3230	4200	2110	0	3180	1150	880	39440
1984	24120	1700	3370	4500	2150	0	3260	1100	920	41110
1985	25400	1800	3580	4860	2210	0	3340	1040	960	43180

GEORGIA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	6160	400	740	680	1220	0	1660	850	450	12150
1973	6400	420	760	740	1250	0	1720	810	450	12530
1974	6710	450	790	810	1280	0	1780	770	460	13050
1975	6950	480	790	880	1300	0	1830	730	480	13430
1976	7240	500	810	950	1330	0	1890	690	490	13900
1977	7530	530	820	1020	1360	0	1940	660	510	14370
1978	7840	550	840	1100	1390	0	2000	620	530	14880
1979	8160	580	870	1170	1410	0	2050	590	550	15380
1980	8490	610	890	1250	1440	0	2110	560	570	15930
1981	8830	640	910	1330	1470	0	2170	540	590	16480
1982	9170	670	940	1410	1500	0	2220	510	610	17020
1983	9520	700	960	1500	1530	0	2280	480	630	17590
1984	9890	730	990	1590	1550	0	2330	460	650	18190
1985	10280	760	1020	1690	1580	0	2390	440	670	18830

HAWAII

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1280	130	310	180	220	40	530	90	50	2860
1973	1320	140	310	200	230	50	550	90	60	2940
1974	1360	150	300	230	230	60	570	80	60	3030
1975	1410	150	310	250	240	60	590	80	60	3150
1976	1460	160	310	270	250	70	600	80	60	3250
1977	1510	170	310	290	250	70	620	70	60	3370
1978	1560	180	310	310	260	80	640	70	70	3470
1979	1610	180	310	340	260	80	660	60	70	3580
1980	1680	190	320	370	270	90	670	60	70	3720
1981	1720	200	310	390	280	100	690	60	70	3820
1982	1770	200	310	410	280	110	710	60	70	3930
1983	1840	210	310	460	290	110	730	50	80	4080
1984	1890	220	310	490	300	120	750	50	80	4190
1985	1950	220	310	510	300	130	760	50	80	4320

IDAHO

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM HOSPITAL		PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	1280	50	220	220	120	0	90	40	70	2090
1973	1320	60	230	240	120	0	90	40	70	2170
1974	1410	60	260	260	130	0	100	40	80	2330
1975	1410	60	240	270	130	0	100	40	80	2330
1976	1450	70	240	290	130	0	100	30	80	2400
1977	1510	70	250	310	130	0	110	30	80	2490
1978	1560	80	260	330	130	0	110	30	90	2580
1979	1620	80	270	350	140	0	110	30	90	2680
1980	1670	80	270	370	140	0	110	30	90	2760
1981	1720	90	280	380	140	0	120	30	90	2850
1982	1780	90	290	410	140	0	120	30	100	2970
1983	1850	100	310	430	150	0	120	20	100	3080
1984	1890	100	310	440	150	0	130	20	100	3150
1985	1960	110	320	470	150	0	130	20	110	3270

ILLINOIS

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM HOSPITAL		PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	23910	1430	2750	2810	3910	10	2770	1410	1410	40420
1973	24510	1510	2750	3010	3990	10	2870	1340	1400	41380
1974	24730	1550	2620	3150	4060	30	2960	1270	1410	41780
1975	25760	1650	2720	3410	4150	30	3050	1210	1470	43450
1976	26450	1720	2710	3620	4220	40	3150	1150	1500	44560
1977	27180	1800	2710	3830	4300	40	3240	1090	1540	45730
1978	27940	1880	2710	4040	4380	40	3330	1040	1580	46940
1979	28710	1960	2720	4250	4460	50	3430	990	1620	48180
1980	29470	2040	2720	4460	4530	50	3520	940	1670	49390
1981	30280	2120	2740	4670	4610	60	3610	890	1710	50680
1982	31100	2200	2760	4880	4690	60	3700	840	1750	51990
1983	31920	2280	2770	5100	4760	60	3800	800	1800	53300
1984	32760	2370	2790	5330	4840	70	3890	760	1840	54660
1985	33610	2450	2810	5570	4920	70	3980	720	1890	56030

INDIANA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM	HOSPITAL	PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	8170	500	1460	1250	1500	0	770	490	460	14590
1973	8430	520	1470	1340	1530	0	800	470	460	15010
1974	8680	550	1460	1420	1550	0	830	440	470	15410
1975	9000	580	1490	1520	1590	0	850	420	490	15940
1976	9300	610	1500	1610	1610	0	880	400	500	16420
1977	9620	640	1510	1710	1640	0	900	380	520	16920
1978	9950	670	1530	1810	1670	0	930	360	530	17450
1979	10290	700	1540	1900	1700	0	950	340	550	17980
1980	10630	730	1560	2000	1730	0	980	330	570	18520
1981	10980	760	1580	2100	1760	0	1010	310	580	19080
1982	11320	790	1600	2190	1790	0	1030	290	600	19620
1983	11690	820	1620	2300	1820	0	1060	280	620	20200
1984	12050	860	1650	2400	1850	0	1080	270	640	20790
1985	12420	890	1670	2520	1880	0	1110	250	650	21390

IOWA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM	HOSPITAL	PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	5790	230	830	980	890	0	650	410	470	10250
1973	5940	240	830	1040	910	0	680	390	460	10480
1974	6060	250	820	1100	930	0	700	370	460	10680
1975	6230	260	820	1160	950	0	720	350	480	10970
1976	6410	270	820	1230	970	0	740	330	490	11260
1977	6600	290	820	1300	990	0	760	320	500	11580
1978	6790	300	820	1360	1020	0	780	300	520	11880
1979	7010	310	830	1430	1040	0	810	280	530	12240
1980	7140	320	810	1480	1050	0	830	270	540	12450
1981	7350	340	810	1540	1080	0	850	260	550	12770
1982	7560	350	820	1610	1100	0	870	240	570	13120
1983	7770	360	830	1670	1120	0	890	230	580	13460
1984	7990	380	840	1740	1140	0	920	220	600	13820
1985	8150	390	830	1800	1160	0	940	210	610	14090

KANSAS

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	4100	190	720	530	650	0	770	160	340	7450
1973	4230	200	720	560	670	0	790	150	330	7650
1974	4310	210	700	600	680	0	820	140	340	7790
1975	4490	220	720	640	700	0	840	140	350	8100
1976	4630	230	720	680	720	0	870	130	360	8330
1977	4790	240	720	720	730	0	890	120	370	8600
1978	4950	250	720	760	750	0	920	120	380	8850
1979	5110	260	730	810	770	0	950	110	390	9120
1980	5240	270	720	850	780	0	970	100	400	9330
1981	5410	280	720	890	800	0	1000	100	420	9610
1982	5580	290	730	930	820	0	1020	90	430	9900
1983	5740	300	730	970	830	0	1050	90	440	10160
1984	5930	310	740	1020	850	0	1070	90	450	10460
1985	6070	320	730	1060	860	0	1100	80	460	10690

KENTUCKY

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	4370	270	320	400	850	0	190	220	350	6980
1973	4530	280	330	430	870	0	200	210	350	7200
1974	4700	300	330	460	890	10	210	200	360	7450
1975	4850	310	330	490	910	10	210	190	370	7650
1976	5030	330	330	520	920	10	220	180	380	7920
1977	5210	340	340	550	940	10	230	170	390	8170
1978	5410	360	340	580	960	10	230	160	410	8460
1979	5610	370	350	610	970	10	240	150	420	8740
1980	5780	390	340	640	990	10	240	140	430	8970
1981	5990	410	350	670	1010	10	250	140	450	9270
1982	6200	420	360	700	1020	10	260	130	460	9570
1983	6410	440	360	730	1040	20	260	120	470	9870
1984	6630	460	370	770	1060	20	270	120	490	10180
1985	6830	470	370	800	1080	20	280	110	500	10460

LOUISIANA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	4500	290	460	400	830	0	990	450	350	8260
1973	4670	310	470	430	840	0	1020	430	340	8510
1974	4850	320	470	460	860	0	1050	410	360	8770
1975	5040	340	470	500	880	0	1090	380	370	9070
1976	5250	360	480	540	900	0	1120	370	380	9380
1977	5450	370	480	580	920	0	1150	350	390	9690
1978	5670	390	490	620	930	0	1190	330	410	10020
1979	5890	410	500	660	950	0	1220	310	420	10370
1980	6100	430	500	700	970	0	1250	300	430	10680
1981	6340	440	510	740	990	0	1280	280	450	11040
1982	6580	460	520	780	1010	0	1320	270	460	11400
1983	6820	480	530	830	1020	0	1350	260	480	11770
1984	7070	500	540	870	1040	0	1380	240	490	12150
1985	7320	520	550	920	1060	0	1420	230	510	12530

MAINE

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	2010	140	210	420	420	0	480	300	130	4110
1973	2060	150	210	450	420	0	490	280	130	4200
1974	2130	160	220	490	430	0	510	270	140	4340
1975	2160	170	210	510	440	0	520	250	140	4410
1976	2230	170	210	550	450	0	540	240	140	4540
1977	2300	180	210	580	460	0	560	230	150	4670
1978	2370	190	220	610	460	0	570	220	150	4800
1979	2440	200	220	640	470	10	590	210	160	4930
1980	2490	210	220	680	480	10	600	200	160	5050
1981	2570	220	220	710	490	10	620	190	160	5190
1982	2640	230	220	750	500	10	640	180	170	5320
1983	2720	240	230	780	500	10	650	170	170	5480
1984	2800	250	230	820	510	10	670	160	180	5620
1985	2860	250	230	850	520	10	680	150	180	5740

MARYLAND

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	6190	590	610	1630	1650	10	1740	710	580	13690
1973	6370	630	610	1760	1690	10	1800	670	570	14110
1974	6580	660	620	1910	1730	10	1850	640	590	14580
1975	6880	710	650	2100	1770	10	1910	600	620	15250
1976	7110	740	660	2250	1810	10	1970	570	640	15770
1977	7360	780	670	2410	1850	10	2030	550	660	16310
1978	7610	820	680	2580	1890	10	2090	520	680	16880
1979	7870	850	690	2740	1930	10	2140	490	700	17450
1980	8220	900	720	2940	1980	10	2200	470	730	18190
1981	8510	940	740	3120	2020	20	2260	440	760	18810
1982	8780	990	750	3290	2050	20	2320	420	780	19410
1983	9070	1030	770	3470	2090	20	2380	400	810	20040
1984	9370	1070	780	3690	2140	20	2440	380	840	20720
1985	9750	1120	820	3920	2180	20	2490	360	870	21530

MASSACHUSETTS

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	16290	1230	1000	3540	2800	10	3320	1970	1400	31560
1973	16620	1290	1000	3780	2860	20	3430	1870	1370	3224[illegible]
1974	16880	1350	980	4000	2920	20	3540	1780	1400	328[illegible]
1975	17380	1420	1000	4280	2980	20	3650	1690	1440	33860
1976	17790	1480	990	4530	3040	30	3770	1600	1480	34710
1977	18220	1550	990	4780	3100	30	3880	1520	1510	35600
1978	18680	1620	1000	5030	3160	30	3990	1450	1550	36520
1979	19130	1690	1000	5290	3220	40	4100	1380	1590	37430
1980	19580	1760	1000	5540	3280	40	4210	1310	1630	38340
1981	20060	1830	1010	5790	3340	40	4320	1240	1670	39310
1982	20540	1900	1020	6040	3400	40	4430	1180	1710	40280
1983	21010	1970	1020	6290	3460	50	4540	1120	1750	41220
1984	21500	2050	1030	6570	3520	50	4660	1060	1800	42240
1985	21990	2120	1040	6850	3580	60	4770	1010	1840	43260

MICHIGAN

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	14850	960	1680	1910	2570	30	2750	700	1000	26450
1973	15280	1020	1690	2040	2610	30	2840	670	990	27170
1974	15690	1060	1670	2170	2660	40	2940	630	1010	27880
1975	16280	1120	1710	2330	2710	40	3030	600	1050	28870
1976	16800	1180	1710	2480	2750	50	3120	570	1080	29740
1977	17350	1230	1730	2620	2800	50	3210	540	1110	30640
1978	17910	1290	1740	2770	2840	60	3300	510	1150	31570
1979	18480	1350	1750	2920	2880	60	3400	490	1180	32510
1980	19110	1410	1770	3080	2930	70	3490	460	1220	33540
1981	19710	1470	1790	3230	2980	70	3580	440	1250	34520
1982	20320	1530	1810	3380	3020	80	3670	420	1290	35510
1983	20920	1580	1830	3530	3060	80	3770	400	1320	36500
1984	21550	1640	1850	3700	3110	90	3860	380	1360	37540
1985	22220	1710	1870	3880	3160	100	3950	360	1400	38640

MINNESOTA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	9780	420	580	1850	1210	20	700	430	620	15620
1973	10020	440	580	1970	1240	30	730	410	610	16040
1974	10250	460	570	2100	1270	40	750	390	630	16460
1975	10570	490	580	2250	1300	40	770	370	650	17020
1976	10860	510	570	2380	1330	40	800	350	670	17520
1977	11170	530	580	2510	1350	50	820	340	690	18030
1978	11510	560	580	2660	1380	50	850	320	710	18610
1979	11840	580	580	2800	1410	60	870	300	730	19170
1980	12190	610	590	2940	1440	60	890	290	750	19750
1981	12520	630	590	3070	1470	60	920	270	770	20310
1982	12870	660	590	3220	1490	70	940	260	800	20900
1983	13210	680	600	3360	1520	70	960	250	820	21460
1984	13560	700	600	3510	1550	80	990	230	840	22060
1985	13930	730	600	3680	1580	90	1010	220	860	22710

MISSISSIPPI

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	2530	130	320	230	490	0	600	330	210	4820
1973	2630	140	320	250	500	0	620	310	210	4980
1974	2750	150	330	270	510	0	640	290	220	5150
1975	2840	150	320	280	520	0	660	280	220	5280
1976	2960	160	320	300	530	0	680	270	230	5450
1977	3090	170	330	330	550	0	700	250	240	5640
1978	3220	170	330	350	560	0	720	240	250	5840
1979	3360	180	340	370	570	0	740	230	260	6040
1980	3460	190	330	390	580	0	760	220	260	6190
1981	3600	200	340	410	590	0	780	210	270	6400
1982	3750	210	350	430	610	0	800	200	280	6610
1983	3890	210	350	460	620	0	820	190	290	6830
1984	4050	220	360	480	630	0	840	180	300	7070
1985	4170	230	360	510	640	0	860	170	310	7250

MISSOURI

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	7480	450	720	950	1400	10	1700	340	720	13780
1973	7740	470	730	1010	1430	20	1750	320	710	14180
1974	7990	490	720	1080	1460	20	1810	310	730	14610
1975	8310	520	730	1160	1500	20	1870	290	760	15150
1976	8620	540	730	1230	1530	20	1930	280	780	15660
1977	8940	570	740	1300	1560	20	1980	260	810	16190
1978	9270	590	740	1380	1600	20	2040	250	830	16730
1979	9610	620	750	1450	1630	30	2100	240	860	17280
1980	9920	650	750	1520	1660	30	2150	230	890	17800
1981	10270	670	750	1600	1690	30	2210	220	920	18360
1982	10610	700	760	1670	1730	30	2270	200	940	18910
1983	10980	730	770	1750	1760	30	2320	190	970	19510
1984	11340	750	780	1830	1790	40	2380	180	1000	20100
1985	11690	780	780	1920	1830	40	2440	180	1030	20670

MONTANA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1470	50	310	290	160	0	180	100	90	2660
1973	1520	60	310	310	170	0	180	90	90	2730
1974	1590	60	330	340	170	0	190	90	100	2870
1975	1610	60	320	350	180	0	190	90	100	2900
1976	1660	70	320	370	180	0	200	80	100	2980
1977	1710	70	330	390	180	0	200	80	100	3060
1978	1770	70	330	410	190	0	210	70	110	3160
1979	1820	80	340	430	190	0	220	70	110	3250
1980	1870	80	340	440	200	0	220	70	110	3330
1981	1950	90	350	480	200	0	230	60	120	3470
1982	2000	90	360	490	200	0	230	60	120	3550
1983	2060	90	360	510	210	0	240	60	120	3660
1984	2120	100	370	530	210	0	250	50	120	3750
1985	2170	100	370	550	210	0	250	50	130	3830

NEBRASKA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	3290	120	360	460	320	0	550	140	350	5600
1973	3370	130	360	490	330	0	560	130	340	5730
1974	3480	140	370	520	340	0	580	130	350	5910
1975	3570	140	370	550	350	0	600	120	360	6060
1976	3680	150	370	580	360	0	620	110	370	6240
1977	3790	160	370	620	360	0	640	110	380	6430
1978	3900	160	370	640	370	0	660	100	390	6610
1979	4020	170	380	680	380	0	670	100	400	6800
1980	4120	180	380	700	390	0	690	90	410	6970
1981	4240	190	380	740	390	0	710	90	430	7170
1982	4360	190	390	770	400	0	730	80	440	7370
1983	4490	200	390	800	410	0	750	80	450	7580
1984	4610	210	400	830	420	0	770	80	460	7770
1985	4730	220	400	870	430	0	780	70	470	7980

NEVADA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	850	50	170	90	130	0	150	60	50	1550
1973	900	50	180	100	140	0	160	60	50	1630
1974	990	60	210	120	140	0	160	60	50	1790
1975	1010	60	210	130	150	0	170	50	50	1830
1976	1060	60	220	150	150	0	170	50	50	1920
1977	1120	70	230	160	160	0	180	50	60	2010
1978	1170	70	240	170	160	0	180	50	60	2090
1979	1230	70	250	190	160	0	190	40	60	2200
1980	1310	80	280	210	170	0	190	40	70	2360
1981	1370	80	290	230	170	0	200	40	70	2460
1982	1440	90	300	250	180	0	200	40	70	2570
1983	1500	90	320	270	180	10	210	40	80	2680
1984	1550	100	330	280	190	10	210	30	80	2770
1985	1650	110	350	310	190	10	220	30	80	2940

NEW HAMPSHIRE

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1840	120	230	510	430	0	240	250	160	3770
1973	1890	130	240	550	440	0	250	240	160	3880
1974	2000	140	250	600	450	0	260	230	160	4090
1975	2020	140	250	630	460	0	260	210	170	4140
1976	2090	150	260	680	470	0	270	200	170	4300
1977	2150	160	260	720	480	0	280	190	180	4410
1978	2210	170	270	750	490	0	290	180	180	4540
1979	2280	180	270	800	500	0	300	170	190	4690
1980	2370	190	290	850	510	0	300	170	190	4860
1981	2430	200	300	880	520	0	310	160	200	4990
1982	2500	210	300	920	530	0	320	150	210	5140
1983	2580	220	310	970	540	0	330	140	210	5310
1984	2650	230	320	1020	550	0	340	130	220	5460
1985	2730	240	330	1060	560	0	340	130	220	5630

NEW JERSEY

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	13290	940	1620	2510	3690	0	2030	1850	900	26830
1973	13660	1000	1630	2700	3780	0	2100	1750	900	27530
1974	13990	1040	1620	2890	3870	0	2170	1670	920	28150
1975	14570	1110	1670	3130	3970	0	2240	1580	950	29230
1976	15030	1160	1680	3350	4070	0	2300	1500	980	30070
1977	15500	1210	1690	3570	4160	0	2370	1430	1010	30940
1978	15980	1270	1710	3790	4250	0	2440	1360	1040	31830
1979	16480	1330	1730	4010	4350	0	2510	1290	1070	32750
1980	17070	1390	1770	4270	4440	0	2580	1220	1100	33840
1981	17590	1450	1790	4490	4540	0	2640	1160	1130	34800
1982	18110	1510	1820	4720	4630	10	2710	1110	1160	35780
1983	18650	1570	1850	4960	4720	10	2780	1050	1200	36780
1984	19210	1640	1880	5210	4820	10	2850	1000	1230	37840
1985	19860	1710	1930	5520	4920	10	2920	950	1270	39070

NEW MEXICO

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1390	70	210	110	340	0	530	80	90	2820
1973	1440	70	220	120	350	0	540	70	90	2910
1974	1550	80	240	140	360	0	560	70	90	3090
1975	1570	80	[illegible]	140	370	0	580	70	100	3130
1976	1630	80	[illegible]	160	380	10	600	60	100	3240
1977	1700	90	[illegible]	170	390	10	610	60	100	3370
1978	1780	90	240	180	400	10	630	60	110	3500
1979	1840	100	250	200	410	10	650	50	110	3620
1980	1920	100	260	210	420	10	670	50	110	3750
1981	1990	110	260	220	430	10	680	50	120	3880
1982	2080	110	270	240	440	10	700	50	120	4030
1983	2160	120	280	260	460	10	720	40	130	4170
1984	2240	130	290	270	470	10	740	40	130	4310
1985	2320	130	300	290	480	10	750	40	130	4450

NORTH DAKOTA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1400	40	160	270	90	0	200	60	140	2360
1973	1450	40	160	290	100	0	200	60	140	2430
1974	1480	50	160	300	100	0	210	60	140	2490
1975	1510	50	150	320	100	0	220	50	140	2550
1976	1560	50	150	350	100	0	220	50	150	2640
1977	1600	50	160	360	100	0	230	50	150	2710
1978	1650	60	160	380	110	0	240	50	150	2790
1979	1720	60	160	410	110	0	240	40	160	2900
1980	1740	60	150	430	110	0	250	40	160	2950
1981	1800	60	160	450	110	0	260	40	170	3050
1982	1860	60	160	480	120	0	260	40	180	3150
1983	1920	70	160	500	120	0	270	40	180	3260
1984	1970	70	160	530	120	0	280	30	190	3340
1985	2000	70	160	550	120	0	280	30	190	3410

OHIO

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	19640	1330	3070	2560	3460	30	2620	1620	1350	35690
1973	20200	1400	3080	2750	3530	40	2710	1540	1340	36580
1974	20570	1450	2990	2910	3580	40	2790	1460	1360	37160
1975	21400	1540	3060	3150	3650	50	2880	1390	1410	38530
1976	22050	1610	3060	3350	3720	60	2970	1320	1450	39580
1977	22730	1680	3050	3550	3780	60	3060	1250	1490	40660
1978	23450	1760	3070	3760	3850	70	3150	1190	1530	41800
1979	24180	1830	3080	3970	3910	70	3230	1130	1570	42970
1980	24870	1900	3070	4170	3970	80	3320	1070	1510	44070
1981	25610	1980	3090	4380	4030	80	3410	1020	1650	45250
1982	26370	2050	3120	4590	4100	90	3500	970	1700	46480
1983	27140	2130	3140	4800	4160	90	3580	920	1740	47720
1984	27910	2210	3160	5030	4220	100	3670	880	1790	48970
1985	28670	2280	3160	5270	4290	110	3760	830	1830	50210

NEW YORK

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	42900	3260	2430	6240	8090	270	6850	6710	3360	80110
1973	43680	3410	2380	6620	8270	320	7080	6380	3270	81410
1974	43890	3500	2230	6880	8430	330	7310	6060	3290	81930
1975	45520	3700	2290	7400	8640	370	7540	5760	3400	84610
1976	46530	3850	2240	7790	8820	400	7770	5470	3470	86340
1977	47590	4000	2210	8180	9000	440	8000	5200	3540	88150
1978	48690	4150	2180	8570	9180	470	8230	4940	3620	90030
1979	49810	4300	2150	8960	9360	510	8460	4690	3700	91940
1980	50810	4440	2110	9330	9540	540	8690	4450	3770	93680
1981	51930	4600	2080	9710	9720	590	8920	4230	3840	95630
1982	53070	4750	2060	10090	9900	630	9150	4020	3920	97590
1983	54200	4900	2040	10470	10080	680	9380	3820	4000	99580
1984	55370	5050	2020	10890	10260	730	9610	3630	4090	101650
1985	56430	5180	1980	11310	10440	790	9840	3450	4160	103570

NORTH CAROLINA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	7840	490	1220	680	1480	0	1370	900	640	14640
1973	8130	520	1240	740	1520	0	1420	860	640	15070
1974	8460	550	1270	810	1560	0	1470	810	660	15590
1975	8750	580	1270	870	1590	0	1510	770	680	16030
1976	9100	610	1300	940	1630	0	1560	740	700	16560
1977	9460	640	1320	1010	1670	0	1600	700	720	17130
1978	9830	670	1350	1080	1700	0	1650	660	750	17700
1979	10220	710	1380	1160	1740	0	1700	630	770	18300
1980	10580	740	1400	1240	1780	0	1740	600	800	18860
1981	10980	770	1430	1310	1810	0	1790	570	820	19480
1982	11390	810	1460	1390	1850	0	1830	540	850	20120
1983	11810	840	1490	1470	1890	0	1880	510	880	20770
1984	12240	880	1530	1560	1920	0	1930	490	900	21450
1985	12650	910	1550	1650	1960	0	1970	460	930	22090

OKLAHOMA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	3150	130	380	520	530	0	790	190	210	5890
1973	3280	140	380	560	540	0	820	180	210	6100
1974	3430	150	400	600	560	0	850	170	220	6370
1975	3550	150	390	640	570	0	870	160	220	6570
1976	3690	160	400	690	580	0	900	150	230	6810
1977	3850	170	410	730	590	0	930	140	240	7060
1978	4010	180	420	780	610	0	950	140	250	7330
1979	4170	190	420	830	620	0	980	130	260	7600
1980	4320	200	430	880	630	0	1010	120	270	7850
1981	4500	200	440	930	650	0	1030	120	280	8140
1982	4670	210	450	970	660	0	1060	110	290	8420
1983	4840	220	460	1020	670	0	1090	110	300	8710
1984	5030	230	470	1080	680	0	1110	100	310	9010
1985	5210	240	480	1130	700	0	1140	100	320	9310

OREGON

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	4110	210	780	750	590	70	490	180	230	7420
1973	4220	220	770	810	610	80	510	180	230	7630
1974	4440	240	830	890	620	90	520	170	240	8040
1975	4490	250	800	940	630	100	540	160	240	8150
1976	4630	260	810	1010	650	100	560	150	250	8420
1977	4760	270	810	1070	660	110	570	140	260	8660
1978	4910	290	820	1140	670	120	590	140	270	8950
1979	5040	300	820	1200	690	130	600	130	270	9190
1980	5220	310	840	1280	700	140	620	120	290	9530
1981	5370	330	850	1360	710	150	640	120	290	9820
1982	5520	340	860	1420	730	160	650	110	300	10090
1983	5660	350	850	1500	740	170	670	110	310	10370
1984	5810	360	860	1570	750	190	690	100	320	10650
1985	5980	380	870	1660	770	200	700	90	330	10970

PENNSYLVANIA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	27130	1740	2860	4290	5810	10	4580	3820	2180	52420
1973	27810	1830	2850	4610	5950	10	4740	3630	2130	53560
1974	28180	1890	2750	4860	6070	20	4890	3450	2160	54280
1975	29080	1980	2760	5240	6220	30	5040	3280	2230	55860
1976	29850	2070	2730	5580	6350	40	5200	3110	2280	57220
1977	30670	2160	2720	5930	6490	50	5350	2960	2340	58660
1978	31540	2250	2720	6280	6620	60	5510	2810	2400	60180
1979	32410	2340	2730	6640	6760	60	5660	2670	2460	61720
1980	33020	2410	2670	6930	6880	60	5810	2540	2500	62830
1981	33930	2500	2680	7290	7020	70	5970	2410	2570	64430
1982	34840	2590	2680	7650	7150	70	6120	2290	2630	66040
1983	35770	2690	2700	8020	7290	80	6270	2170	2700	67690
1984	36730	2790	2710	8420	7420	90	6430	2070	2770	69420
1985	37430	2860	2670	8770	7550	90	6580	1960	2820	70740

RHODE ISLAND

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED [illegible]SES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OT[illegible] HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	2100	160	100	330	390	0	5[illegible]0	230	150	3960
1973	2150	160	100	360	400	10	520	210	150	4050
1974	2160	170	90	380	410	10	530	200	150	4100
1975	2260	180	100	420	420	10	550	190	160	4270
1976	2320	190	90	450	430	10	570	180	160	4400
1977	2380	190	90	480	440	10	580	170	170	4510
1978	2460	200	100	510	450	10	600	170	170	4660
1979	2530	210	100	550	450	10	620	160	180	4800
1980	2[illegible]80	220	90	570	460	10	630	150	180	4900
1981	2650	230	90	610	470	10	650	140	190	5040
1982	2730	240	100	640	480	10	670	140	190	5190
1983	2800	250	100	680	490	20	680	130	200	5330
1984	2870	250	100	720	500	20	700	120	200	5470
1985	2940	260	100	760	510	20	720	120	210	5620

SOUTH CAROLINA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	3070	150	660	350	910	0	1030	470	250	6900
1973	3190	160	670	390	930	0	1070	450	250	7110
1974	3340	180	700	420	950	0	1100	430	260	7380
1975	3440	180	680	450	970	0	1140	410	260	7540
1976	3590	190	700	480	1000	0	1170	390	270	7790
1977	3740	200	710	520	1020	0	1210	370	280	8050
1978	3900	210	730	560	1040	0	1240	350	290	8330
1979	4070	220	750	600	1060	0	1280	330	300	8610
1980	4210	230	760	630	1080	0	1310	310	310	8850
1981	4380	240	780	680	1100	0	1350	300	320	9150
1982	4560	260	800	720	1130	0	1380	280	330	9450
1983	4740	270	820	760	1150	0	1420	270	340	9760
1984	4920	280	850	800	1170	0	1450	260	350	10080
1985	5090	290	860	850	1190	0	1480	240	360	10360

SOUTH DAKOTA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1170	50	230	320	170	0	360	50	130	2480
1973	1200	50	230	340	180	0	380	50	130	2560
1974	1240	50	230	370	180	0	390	50	140	2630
1975	1260	50	220	380	180	0	400	50	140	2690
1976	1310	60	220	410	190	0	410	40	140	2790
1977	1350	60	220	430	190	0	430	40	150	2860
1978	1400	60	230	460	200	0	440	40	150	2980
1979	1440	60	230	480	200	0	450	40	160	3050
1980	1470	70	220	500	200	0	460	40	160	3110
1981	1520	70	230	520	210	0	470	30	170	3220
1982	1560	70	230	530	210	0	490	30	170	3290
1983	1610	70	230	560	210	0	500	30	170	3400
1984	1670	80	230	600	220	0	510	30	180	3520
1985	1710	80	230	620	220	0	520	30	180	3590

TENNESSEE

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	5210	290	380	290	1080	0	1020	460	370	9100
1973	5450	310	390	320	1100	0	1050	440	370	9420
1974	5740	330	400	350	1120	0	1080	410	390	9810
1975	5960	340	390	370	1140	0	1120	390	400	10110
1976	6230	360	400	400	1170	0	1150	370	410	10490
1977	6520	380	400	430	1190	0	1190	350	430	10880
1978	6820	390	410	460	1210	0	1220	340	450	11290
1979	7120	410	420	490	1230	0	1250	320	460	11710
1980	7420	430	430	520	1250	0	1290	300	480	12120
1981	7740	450	430	550	1280	0	1320	290	500	12550
1982	8060	470	440	580	1300	0	1360	270	510	12990
1983	8390	490	450	610	1320	0	1390	260	530	13450
1984	8730	510	460	650	1340	0	1420	250	550	13910
1985	9060	530	470	680	1360	0	1460	240	570	14360

TEXAS

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	15660	700	1700	1090	2980	0	3160	1070	1020	27380
1973	16290	740	1740	1180	3060	0	3270	1010	1020	28300
1974	17150	800	1840	1290	3150	0	3370	960	1070	29620
1975	17720	830	1830	1380	3220	0	3480	910	1100	30470
1976	18460	880	1870	1480	3300	0	3580	870	1140	31570
1977	19220	920	1910	1580	3370	0	3690	820	1180	32700
1978	20020	970	1950	1690	3450	10	3800	780	1220	33890
1979	20830	1020	2000	1790	3530	10	3900	740	1270	35100
1980	21720	1070	2070	1910	3610	10	4010	710	1310	36420
1981	22590	1130	2120	2020	3680	10	4110	670	1360	37700
1982	23470	1180	2180	2130	3760	10	4220	640	1410	38990
1983	24360	1230	2230	2250	3840	10	4330	610	1450	40300
1984	25290	1290	2300	2370	3920	10	4430	580	1500	41670
1985	26300	1350	2370	2510	4000	10	4540	550	1560	43180

UTAH

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1760	80	180	130	400	0	340	30	150	308
1973	1820	90	190	140	410	0	350	30	140	318
1974	1940	100	210	160	430	10	360	30	150	337
1975	1960	100	200	170	430	10	370	30	160	342
1976	2030	100	200	180	440	10	380	30	160	354
1977	2100	110	210	190	460	10	390	30	170	365
1978	2170	120	210	200	470	10	400	20	170	378
1979	2250	120	220	220	480	10	420	20	180	391
1980	2330	130	230	230	490	10	430	20	180	406
1981	2420	140	240	250	500	10	440	20	190	419
1982	2500	140	240	260	510	10	450	20	200	434
1983	2580	150	250	280	520	10	460	20	200	448
1984	2670	160	260	290	530	20	470	20	210	462
1985	2760	160	270	310	540	20	480	20	220	477

VERMONT

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	1100	80	130	310	300	0	110	120	90	224
1973	1110	80	130	330	300	0	120	120	90	227
1974	1160	80	140	360	310	0	120	110	90	237
1975	1170	90	130	370	320	0	120	110	100	241
1976	1200	90	130	390	320	0	130	100	100	247
1977	1250	100	140	430	330	0	130	100	100	258
1978	1290	100	140	460	340	0	140	90	110	266
1979	1320	110	140	480	350	0	140	90	110	272
1980	1360	110	140	510	350	0	140	80	110	281
1981	1410	120	150	530	360	0	150	80	120	291
1982	1430	120	150	550	370	0	150	70	120	296
1983	1480	130	150	580	370	0	160	70	120	307
1984	1520	130	160	600	380	0	160	70	130	315
1985	1560	140	160	640	390	0	160	60	130	324

VIRGINIA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	7450	410	960	630	1660	0	1830	930	590	14470
1973	7710	430	980	690	1700	0	1890	880	580	14870
1974	7970	460	990	740	1740	0	1950	840	600	15290
1975	8300	490	1020	800	1780	0	2020	800	620	15830
1976	8620	510	1040	870	1820	0	2080	760	640	16330
1977	8950	540	1060	930	1860	0	2140	720	660	16860
1978	9300	570	1080	990	1900	0	2200	680	680	17410
1979	9640	590	1110	1060	1940	0	2260	650	710	17960
1980	10010	620	1130	1130	1980	0	2320	620	730	18550
1981	10380	650	1160	1200	2020	0	2380	590	750	19130
1982	10760	680	1190	1270	2060	0	2450	560	780	19740
1983	11150	710	1220	1340	2110	0	2510	530	800	20360
1984	11540	740	1250	1420	2150	0	2570	500	820	20990
1985	11950	770	1280	1500	2190	0	2630	480	850	21650

WASHINGTON

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM INPATIENT	HOSPITAL OUTPATIENT	PHYSICIAN OFFICE	NURSING HOMES	COMMUNITY HEALTH	HMO CLINIC	OTHER HOSPITALS	PRIVATE DUTY+MISC	EDUCATORS	TOTAL
1972	6260	240	860	1530	910	530	1140	230	460	12160
1973	6210	230	690	1670	940	630	1180	220	440	12200
1974	6210	230	600	1780	960	670	1210	210	450	12310
1975	6410	240	570	1960	980	730	1250	190	460	12800
1976	6460	230	470	2100	1010	790	1290	190	470	13020
1977	6520	230	390	2250	1030	860	1330	180	480	13260
1978	6580	220	310	2410	1050	930	1370	170	490	13530
1979	6630	220	240	2560	1080	1000	1400	160	500	13780
1980	6700	210	180	2730	1100	1080	1440	150	510	14110
1981	6730	200	120	2900	1120	1170	1480	140	520	14380
1982	6740	180	70	3070	1150	1260	1520	140	530	14640
1983	6720	160	30	3240	1170	1350	1560	130	540	14910
1984	6680	140	10	3410	1190	1460	1590	120	550	15170
1985	6670	120	0	3630	1220	1570	1630	120	560	15520

WEST VIRGINIA

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM HOSPITAL		PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	3120	180	300	190	490	0	430	260	220	5180
1973	3220	190	300	210	500	0	450	240	220	5320
1974	3320	200	300	220	510	0	460	230	220	5460
1975	3370	200	290	230	520	0	470	220	220	5530
1976	3480	210	290	250	520	10	490	210	230	5690
1977	3610	220	290	260	530	10	500	200	240	5870
1978	3720	230	290	280	540	10	520	190	240	6020
1979	3860	240	300	300	550	10	530	180	250	6220
1980	3900	250	280	300	560	10	550	170	250	6270
1981	4040	260	280	320	570	10	560	160	260	6470
1982	4180	270	290	340	580	10	580	150	270	6660
1983	4310	280	290	350	590	10	590	150	280	6840
1984	4450	290	300	370	600	10	600	140	290	7040
1985	4520	290	280	380	610	10	620	130	290	7140

WISCONSIN

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM HOSPITAL		PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	8720	410	730	2130	1290	30	1220	260	720	15500
1973	8970	430	730	2280	1320	30	1260	250	710	15980
1974	9190	440	710	2440	1340	60	1300	240	730	16450
1975	9470	460	700	2600	1360	60	1340	220	760	16990
1976	9780	490	710	2760	1390	70	1390	210	780	17560
1977	10100	510	710	2930	1410	70	1430	200	810	18170
1978	10420	530	710	3090	1430	80	1470	190	830	18760
1979	10750	550	710	3270	1460	80	1510	180	860	19380
1980	11100	580	720	3450	1480	90	1550	170	890	20030
1981	11430	600	720	3600	1500	100	1590	160	920	20630
1982	11780	620	730	3790	1520	110	1630	160	950	21290
1983	12140	650	730	3960	1550	110	1670	150	980	21940
1984	12480	670	740	4150	1570	120	1710	140	1000	22580
1985	12850	690	740	4350	1590	130	1750	130	1040	23280

WYOMING

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM HOSPITAL		PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	630	20	120	90	120	0	140	20	40	1190
1973	660	20	120	90	130	0	150	10	40	1220
1974	710	20	130	110	130	0	150	10	40	1300
1975	700	20	120	100	130	0	160	10	40	1290
1976	740	20	130	120	140	0	160	10	40	1360
1977	760	20	130	120	140	0	160	10	40	1400
1978	780	20	140	130	140	0	170	10	40	1440
1979	810	20	140	130	150	0	170	10	40	1470
1980	820	20	130	130	150	0	180	10	50	1490
1981	850	30	140	140	150	0	180	10	50	1540
1982	880	30	140	150	160	0	190	10	50	1600
1983	910	30	150	160	160	0	190	10	50	1660
1984	940	30	150	160	160	0	200	10	50	1710
1985	960	30	150	170	170	0	200	10	50	1740

TOTAL ALL STATES

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES

YEAR	SHORT-TERM HOSPITAL		PHYSICIAN	NURSING	COMMUNITY	HMO	OTHER	PRIVATE		
	INPATIENT	OUTPATIENT	OFFICE	HOMES	HEALTH	CLINIC	HOSPITALS	DUTY+MISC	EDUCATORS	TOTAL
1972	379320	23600	41760	56450	70110	2160	66430	36770	26710	703310
1973	390030	24830	41790	60680	71720	2560	68660	34930	26360	721560
1974	401300	26000	42000	65010	73320	2950	70880	33190	27060	741720
1975	414470	27320	42000	69910	74980	3340	73110	31530	27900	764540
1976	427410	28570	42100	74510	76580	3710	75330	29950	28710	786880
1977	440920	29850	42340	79200	78180	4070	77560	28450	29550	810120
1978	455060	31170	42680	84010	79780	4410	79790	27030	30420	834350
1979	469500	32510	43130	88850	81370	4760	82010	25680	31320	859130
1980	484300	33870	43640	93920	82980	5130	84240	24400	32220	884690
1981	499210	35230	44120	98840	84560	5530	86460	23180	33150	910290
1982	514290	36590	44620	103800	86150	5960	88690	22020	34080	936200
1983	529530	37950	45160	108970	87740	6430	90910	20920	35040	962650
1984	545110	39300	45670	114440	89370	6930	93140	19870	36020	989840
1985	561110	40660	46280	120400	91010	7470	95360	18880	37020	1018180

Appendix D

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